RAILROAD GAZETTE

UNIONS VS. INDIVIDUAL PROGRESS.

Not long ago, the general superintendent of one of the most important roads in the Southwest, a man who had himself risen from the rank of brakeman, made the remark that, in his opinion, the men who were to-day filling subordinate positions on the railroads were not of the same caliber as the men who entered railroad service twenty years ago. He was prompted in speaking by a number of cases of carelessness and stupidity on the part of his men which had come under his observation while on a trip of inspection. He had seen shiftless work in switching cars in the yard, lax observance of rules by trainmen, useless delays to trains, and helplessness and lack of initiative in times of emergency; but his statement expressed a spirit of resignation rather than of indignation. The cases were not flagrant ones that called for dismissal from service, but they evidenced a far more troublesome symptom—an almost total lack of *esprit de corps*, which could not be artificially created by discipline. They were evidences of a disorder too deep seated to be cured by local treatment.

It has long been recognized that the personal relations of the employed to the employer decrease about in proportion to the growth of an industry. The apprentice of olden times had every incentive to perform his work not only in a manner which would satisfy the letter of the requirements placed upon him, but in a manner which would gradually increase his own education, skill, and capacity to become master. But with the growth of enterprises so great that the position of master seems wholly unattainable to the worker in the ranks, while specialization and division of responsibilities first places lieutenants under the captain; then sergeants under each lieutenant, and then corporals under each sergeant, the personal incentive, springing from contact with the head and brains of the business itself, is entirely gone.

When the specialization of modern industries had progressed beyond the point where the apprentice could follow his master as leader, there was great need for some other leadership to fill the vacant place, and here it was that the labor union came in. An organized body of men with high ideals could do much in any craft. As has been pointed out in the *Railroad Gazette*, and by economic writers everywhere, a chance was afforded to provide for the careful training of apprentices, the promotion of proficient workmanship, and the elevation of the intellectual and moral plane of the working men. But, unfortunately, it is only in the most exceptional cases that the labor union movement has worked out in that way. The grave charge which lies against nearly every labor leader of the present day is that he is using his organization as a tool with which to drive bargains, and that to secure the unity necessary to accomplish this, he is sternly repressing, instead of developing, individualism. The trade union bargain is always measured in terms of quantity, not of quality, and it will not do for the skilled workman to so develop his craft that it cannot be measured by the unit with which the union is bargaining. Further, in order that time and output may be made synonymous union terms for purposes of barter, the individual workman must be prevented from mixing his units of service. Twenty years ago an engineer was his own hostler and mechanic; all of his spare time was spent at the roundhouse cleaning and polishing, tinkering with the valve gear, tightening the bearings and oiling up his engine as a trainer would groom a race horse. To-day he takes an engine out and brings it back, leaving to some other man or men, the cleaning and the repairing. He is not paid to do that.

It may indeed be questioned whether the specialists at the head of departments have not strengthened the trade union teaching to perform only the letter of the requirement, in their effort to work economies through subdivision of labor. It is quite obvious that labor must be subdivided in a complex organization, but it is possible to make some economies very expensive, if they are effected at the price of the intelligence of the men employed. The present trade union tendency to jealously limit activity and restrict output works in only too well with the evil features of specialization which are the penalty corporations must pay for being big. A writer quoted in another column complains that the railroad private no longer carries a Marshal's baton in his knapsack, for the unions have substituted seniority for merit as a basis of promotion, and throw all their influence and power against individual progress.

The remarks of the anonymous railroad official referred to above, were shown to a passenger conductor, an intelligent and thoughtful man, who made the comment that in these days neither conductors nor enginemen have a chance for promotion in railroad service; that trainmasters are usually made out of train despatchers, and master mechanics, roadmasters and superintendents are now usually made out of the graduates of technical schools. He himself had spoken to the superintendent but twice in fifteen years' service, and he thought that the changed order of promotion and the lack of contact between officers and men were the causes responsible for the deterioration in energy and effort.

But there is no use wasting tears over this inevitable effect of the specialization of work and the subdivision of authority made necessary by the great and complex railroad and industrial organizations of the present day. The matter which needs adjustment, and the evil for which there is a remedy, is the wrong and shortsighted viewpoint of unions which emphasize and exaggerate this situation, and do all in their power to hinder the working out of the principle that the fittest may not merely survive, but may win rewards proportionate to the field of the industry in which they are engaged. When the efforts of the labor leader are confined to restriction of output, and when each minutely subdivided craft jealously guards its own boundaries against encroachment, the individual worker in the big corporation suffers all the disadvantages of its bigness, without being permitted to aspire to its correspondingly large rewards. How can it be otherwise than that the "tone of the men" should deteriorate, when their own leaders make them keep their eyes on the ground?

ESTIMATING THE VALUE OF RAILROAD PROPERTY.

In the annual report which it submitted to Congress last December the Interstate Commerce Commission recommended an appropriation of several hundred thousand dollars to be expended in securing reliable data concerning the value of the railroad property of the United States. The objects of such an inquiry, as stated by the Commission, are two-fold. The results, in its opinion, would contribute to the solution of rate problems by throwing light upon the question as to what aggregate revenue a particular line might properly derive from its traffic, and (second) it would afford a basis for taxation. To an outsider it might seem somewhat strange that the Commission, which has no functions in connection with the taxation of railroad property, saw fit to devote the larger portion of the space which it accorded to this subject to the argument which it derived from the alleged value of such an inquiry in connection with problems of State and local taxation. Great industry was shown in the compilation of facts in support of this contention, and elaborate tables were introduced, with the evident purpose of exhibiting in the sharpest possible contrast the differences in the practices of the states in regard to railroad taxation. Besides the pages of matter supporting this branch of the argument, the two brief paragraphs urging the utility of "an authoritative determination of railroad values" for the purpose of regulating rates seem insignificant, indeed. The discrepancy even suggests that the Commission, having had some experience in the field of rate regulation, is doubtful of the strength of its argument upon this score; while, having no practical familiarity with taxation methods or problems, it was readily beguiled by the superficial plausibility of the latter branch of the argument. Whatever may be the true conclusion in this particular, it should be borne in mind that there is a radical dissimilarity between the conditions of the two problems. However defective such a conclusion may be from the point of view of sound economics, the right of state and local governments to tax railroads and similar enterprises as "going concerns" has the sanction of the highest judicial authority. In other words, it has become an established principle of law that the taxing authority may add to the real value of the property owned an assumed special value which it regards as accruing to a particular aggregation of property through its combined utilization in a particular business. (For the attitude of Massachusetts on this question, see "The Franchise in Capitalization," printed in the *Railroad Gazette* last week.) Thus the horses and wagons of an express company may be assumed, for taxing purposes, to have value beyond other horses and wagons because they are utilized as a part of an extensive and systematized express business. Now, it is obvious that no rate making authority has any business with this intangible and illusive kind of value. The Interstate Commerce Commission would not for a moment

recognize it in fixing the rate for any service, should that body ever be endowed with rate-making authority, and if it made such a mistake its action would never receive the approval of the courts. These considerations have become important because, although Congress did not see fit to give effective approval to the Commission's recommendation by providing an appropriation for the purpose urged, the latter body has, through an extraordinary chance, obtained an opportunity to prosecute the desired inquiry and to have its cost met out of the appropriation for another branch of the Federal Government. An estimate of the material wealth of the country has been a recognized feature of the work of the Federal Census Bureau for several decades. Naturally railroad property constitutes an important item in this aggregate, and its value must carefully be estimated. The present Census Bureau is now working on its estimates of the wealth of the nation, and having found no more satisfactory method of obtaining railroad values, has appealed to the Commission for aid. The latter will prosecute the inquiry, under the direction of Professor H. C. Adams, of the University of Michigan, who is its chief statistician, and the Census Bureau will foot the bills. Just how this arrangement will affect the result is not yet evident, but it is hardly likely that Professor Adams will subordinate his well-known desire to find a means of generally augmenting railroad taxation to the remote possibility of utilizing a low valuation so as to support the desire of some members of the Commission to obtain legislation under which great reductions in railroad rates can be compelled. The method to be used is to be based, it is understood, upon that devised by Professor Adams under instructions from the late Governor Pingree, of Michigan, when the latter devoted his attention to shifting the taxes of the state so that they should fall principally upon the corporations. This method provides, by an elaborate and complicated process, for giving an assumed value to railroad franchises, and thus adding to real and tangible values an intangible element. In the present instance the process will apparently be further complicated by occasional resort to "stock and bond" and "capitalization of earnings" methods of valuation, both of which have been officially condemned by the Commission, but which may be utilized as a means of saving expense and time. In any event, by giving recognition to intangible values in connection with railroads, the Census Bureau will have introduced an element which it has not recognized in any other portion of its work, and will have gone far out of its way to swell the reported value of railroad property in such a way as to make it incomparable with that of any other part of the material wealth of the nation. A statistical aggregate made up of incongruous elements is worse than useless; it is positively and dangerously misleading.

The papers discussing electric railway competition with the railroads, which have been given much space in the *Railroad Gazette* during the last two years, have all been written from the standpoint of the steam roads. The contribution by Ernest Gonzenbach, printed elsewhere in this issue, reviews the same topic from the viewpoint of the interurban road. Mr. Gonzenbach, Engineer of the Youngstown & Southern electric line in Ohio, and author of *Engineering Preliminaries for an Interurban Electric Railway*, although believing wholly in the future of electric railways, does not hesitate to point out with great clearness some of their present limitations. We are disposed to take issue with his statement that when the demands of through service and quick time have been fully met by the electric roads, a most vigorous warfare between them and the steam roads may be looked for. It has always been held in these columns that the prime, paying function of the interurban road was short-haul traffic. In perfecting a through service an interurban line must needs sacrifice its advantage of a continuous terminal from one end to the other of every town through which it passes, since the very convenience which this affords to passengers precludes fast time. Moreover, a through service in the proper sense of the word requires private right of way, and there seems no reason to suppose that an electric line would be any better qualified thus to compete for traffic between distant points than a steam line. If developments in the art throw the advantage to electricity, the steam roads are in a position where they can electrify their present lines much more readily than can the interurban companies build new ones to compete with them. Somewhat the same criticism seems to lie on Mr. Gonzenbach's comment that the road (interurban) which stands the best chance of making money from freight traffic is naturally the one which opens new territory or new routes not touched by existing steam lines, and does not come into competition with them. The history of the interurban roads thus far shows that the most money has been made by handling a very light class of freight traffic that did not interfere with the passenger service, and this traffic, corresponding almost to an express service, has been most profitable where the territory was the most built up, and hence where competition with the steam roads was most dense. Throughout Mr. Gonzenbach's interesting paper, the point which most forcibly strikes the reader is that the author considers not how electric roads may compete with steam roads, but how steam roads may compete with electric roads, thus giving graphic testimony to the phenomenal progress in interurban railroad building and management within the last few years, and conveying again to steam roads with important short-haul traffic the warning that they must not be caught with their hands in their sleeves.

The extent to which suburban territory is dependent for its development upon a thoroughly harmonized transportation service is nowhere better shown than in the country which the New Haven road now proposes to open up by the improvement of its Harlem branch between the Harlem river at Port Morris and New Rochelle. The suburban territory along the Harlem road, which is used by the main line trains of the New Haven road below Mount Vernon, has been highly developed for a great many years, like the suburban territory across the Hudson river and that along the main line of the New York Central as far as Yonkers and beyond, but the towns reached by the inadequate service of the old Harlem branch of the New Haven road have scarcely developed at all, although situated within a radius of ten miles from New York. The service was inconvenient, involving a change of cars at the Harlem river and the use of the elevated lines from that point into the city, and hence resulted the curious anomaly of an undeveloped district in the midst of a thickly populated suburban territory. The present plans contemplate not only a frequent service over a first class roadbed, but also a through connection with the subway, and it may readily be imagined that the towns along the shore between New Rochelle and Port Morris will develop a very profitable traffic. The building of the subway really furnished the key to the situation, so far as the passenger traffic is concerned; for, during all these years while the overflow population from New York has been seeking homes within a short distance of the city, the electric lines as well as the steam road have been effectually prevented by their lack of through connections from giving this particular district a service that would make it an important suburban community.

The new six-track line, with its potentiality for lessening the serious congestion which now exists on the main line north of New York, is also of the highest importance to freight traffic, and fits in as an important part of the long discussed plan for a freight route from the new Pennsylvania Greenville terminal across New York Bay to a connection with the Long Island road at 39th street, South Brooklyn, thence through Brooklyn and Long Island City over an elevated structure and over the projected Randall's Island bridge across the East River to Port Morris.

The statement that the cars will be of standard construction similar to those used by the Interborough, means that direct current will be used. Even if local conditions did not make necessary the use of direct current motors, it is doubtful if a great deal would be saved by the use of alternating current motors inasmuch as one power house at a point such as New Rochelle could supply the entire line, with the aid of two or possibly three sub-stations, containing step down transformers and rotary converters. In fact, the step-down transformers may not be necessary, as the distances are so short that the voltage of the main distributing line need not exceed 3,000 volts, which can be converted by a motor-generator set. The length of the transmission line might be decreased by building the power house at West Farms in which case the greatest distance fed by any one line would not exceed 3½ miles. The detail plans of the electrical equipment have not yet been given out, but the arrangement and location of the power house and sub-stations will probably be made with the ultimate end in view of making the present scheme fit in with future extensions of the electric service.

Another article in this issue tells of the action of the Chicago & Alton in correcting bad practice in loading, checking and handling freight. After that article was written, the address of Mr. R. C. Richards, of the Chicago & North Western, came to hand, and though actions speak louder than words,

we put Mr. Richards' article in type first, and printed a part of it last week. It is nothing but words, but in this case we are glad to commend the North Western's words as heartily as the Alton's action. For railroad men's reading, a more spicy article than Mr. Richards' is seldom seen. As the reader will naturally infer, words are not the only corrective measures that are in use on the North Western; but the idea of giving such an address is particularly commendable because words, of the right kind, are so comparatively scarce in the operating department. Railroad officers glory in being men of action, and all who know them join in that feeling; but practice without theory is always in danger of being illogical and wasteful. Every agent on the North Western should henceforth find it easier to train his men to carefulness and intelligence in their work. Not the least valuable part of Mr. Richards' address is that which hits the superintendents; that wherein he speaks of the need of more supervision and inspection. That paragraph should be read three times in every superintendent's office, and then pasted in the superintendent's prayer book under the words "Read, mark, learn and inwardly digest." This warm praise of Mr. Richards is not called out by his originality of thought, but by his refreshing plainness of speech. The *idea* of having more and better supervision is not original; and it is one that, probably, needs no introduction in superintendents' offices; but discussion of it —which should lead to putting the idea in practice—is conspicuously lacking. Mr. Richards' field of action might be widened, with much profit.

Freight Damage Bills and Their Settlement.

Two recent news items which have not received much notice but which may prove to have marked significance are those announcing, on the Chicago & Alton, the establishment of a freight tracing office, and on the Louisville & Nashville the appointment of two traveling claim agents. The constant stream of complaints from consignees about delays in settling bills for lost and damaged freight is one of the oldest reproaches to the railroad service. The stream is not always a flood nor are the complaints always reasonable; but the condition is often a real discredit to the railroads interested and the annoyance to conscientious managers is one that cannot reasonably be thrust aside as too trifling or too remote to deserve attention.

And the thing that has led to action at the present time is that the volume of damage bills has greatly increased. The duty of fighting unreasonably importunate claimants or of preventing delays in the investigating offices is one which, like that of feeding the poor, is always with us; but just now there is the further problem of reducing the number of just claims; of carrying freight more safely. The use of large cars and large engines, with the resulting great economies has had its incidental unfavorable conditions, and this is not the least of them. In loading 36-ft. cars full to the roof care is required to stow packages so that they will not damage each other, and this is a kind of care that freight-house men have not been sufficiently trained in. In unloading a part of such a load, the part remaining needs attention to make it ride safely during the rest of its journey, and this attention must be given by men who naturally shirk the duty if they are not looked after. The use of automatic couplers has relieved enginemen and brakemen so completely from the care formerly required to avoid crushing men between buffers that cars are allowed to bump together with any degree of violence that may seem desirable for the purpose of saving time; any degree short of that which it is seen will surely cause the culprit to be called into the superintendent's office. This rough handling has always been practiced in cases where it was known that no man was or would be between the cars, but now we have this evil condition with all cars at all times; and damage claims have piled up in heaps like mountains.

The question naturally arises whether the two roads mentioned have taken the best means of meeting this difficulty. In other words, what need is there for new or different offices or officers? Is not the usual organization fully adequate? The Louisville & Nashville traveling men are to visit every competitive point every month. This is good as far as it goes, but how about non-competitive points? Apparently these men have some power to settle small claims, although no specific statement has been made to that effect. Their influence in reducing the causes of damage must be only indirect. The Chicago & Alton official, on the other hand, goes directly to the freight houses and freight conductors. He finds the men who have caused the trouble. His usefulness, like that of a traveling passenger or freight agent, must depend on his personality. If he has the right combination of the qualities of lawyer, detective and executive officer he can accomplish great good—unless the Alton is in better condition than most roads. Correcting the faults of yard switchmen is not so easy a task as that of straightening out freight-house loaders, for each yard man is to a considerable degree his own boss and a single inspector cannot deal with 20 or 50 men at once; but, surely, if a yard man can be trained to switch dining cars without breaking their fragile contents we can train him to do the same with freight cars—if we deem it worth while.

The significant and commendable thing on both roads is the putting of the work in the hands of men who make claims and damages their chief business. Existing faults are due largely to the fact that their treatment is so generally in the hands of men with whom some other duty comes first. So far as can be judged from the situation on railroads generally, every company ought to imitate both of those which we have here named; ought to stop breakages by direct attention to freight house and freight yard work, and at the same time put in operation a reflex influence in the same direction by more promptly and energetically investigating breakages which have already occurred. It may not be very logical to look to the freight claim agent to prevent collisions and loss of lives on freight trains; and yet there can be no question that sufficient energy applied to his department could be made, in many cases, to do just that thing. Prompt and thorough inquiry into every instance of damaged freight would fix the responsibility, in a good percentage of cases, on men who had banged the cars together at furious speeds in switching; and this abuse of buffers and draw gear is the concealed cause of many a subsequent break-in-two, costing much money, and, occasionally, one or more lives. And if this worst and most dangerous evil—particularly dangerous because a break-in-two not only makes a great wreck but also endangers fast passenger trains—could thus be cured, the cure of the lesser evils of money loss to the company and annoyance to the owners of freight, would be accomplished at the same time.

The German Railroad Union in 1902.

The railroads forming the German Railroad Union had in 1902 an average of 57,926 miles of road and, with second track, sidings, etc., 96,797 miles of track. During the year the rails were renewed on 2,745 miles of this track, less than 30 miles of the renewals being made with iron rails. These renewals amounted to 2% per cent. of the whole track. That proportion in the United States would amount to about 5,820 miles of track, which with 84 lbs. rails would require 768,240 tons of rails for renewals alone. Probably the weight of rails used for renewals, taking the country as a whole, is still somewhat less than 84 lbs. per yard, however. In this, no account is taken of street railroads. For repairs and renewals of these 96,797 miles of track, 10,293,220 wooden and 1,925,991 iron cross ties were used, which is an average of 126 per mile. In this country this would mean a little less than 5 per cent. of the ties in track, indicating an average life of 20 years per tie. In Germany there are fewer ties per mile; but the practice varies, the number of late years being greater than formerly. But with only 2,000 ties per mile, the renewals were but 6.3 per cent. in 1902, indicating an average life of 16 years, which is more than double the average life here. This alone indicates that nearly all ties on the roads of the German Union have been treated. The number of wooden ties used in 1902 was nearly the same as the year before; the number of steel ties nearly one-fifth greater. The consumption of the latter depends partly on the price of iron, which was cheaper in 1902 than for some years previously. Even then, however, for every 1,000 wood only 187 metal ties were used. In 15.84 per cent. of the track the rails weigh 60 lbs. or less per yard; in 54.73 per cent., 60 to 70 lbs.; in 24.52 per cent., 70 to 80 lbs.; in 8.12 per cent., 80 to 90 lbs.; in 0.55 per cent. (that is on 392 miles of track), more than 90 lbs. There is a decided increase in the use of heavy sections from year to year.

Freight traffic for the year amounted to 56,738 millions of ton-miles, equivalent to 627,247 ton-miles per mile of road, or 859 tons each way daily (against 1,087 in the United States for the year ending six months later). On the other hand the German Union passenger traffic was at the rate of 465 each way daily, against 136 in the United States. Per inhabitant (approximately) the distance traveled by rail was 182 miles in the countries of the German Union, and 250 in the United States; and the freight traffic was 2,004 ton-miles per inhabitant here against 490 there. The average receipt per passenger-mile was a trifle less than 1 cent on the German Union (0.9984 cent), against 1.986 cents here; the average per ton-mile, 1.388 cents there and 0.757 cent. The average distance run by the 638,200 freight cars was 20,196 miles, or 55 miles per day. Their average actual load was 13,202 lbs., which was about 42 per cent. of their capacity. At the end of 1902, there were 419,631 open freight cars and 218,571 box, or other covered freight cars. The proportion of covered cars is much greater in all continental countries than in England.

The 61,971 passenger cars in the German Railroad Union at the end of 1902 had seats for 2,699,919 passengers, an average of 43½ per car. The seats in first-class cars were only 4.2 per cent. of the whole number, against 17.5 second-class, 62.5 third-class,

and 15.8 fourth-class. In most of the countries there is no fourth class, though those which have it perhaps have the larger population. Per mile of railroad there were seats for 47 in passenger cars of all classes. On the average 24 per cent. of the seats were occupied while running—equivalent to an average of about 14 per car in this country, which is rather above than below our actual average, our average passenger-train load being not more than 47, here. At German Union rates our railroads would have earned $193,000,000 *less* from passengers and $1,014,000,000 *more* from freight, or on the whole $821,000,000 more, which is nearly 4½ times the amount paid in dividends that year. On the other hand the German Union railroads at the American rates would have earned $184,000,000 *more* from passengers and $389,000,000 *less* from freight, or $205,000,000 less in all. Of course the American fares would have destroyed the larger part of the German passenger traffic, and the German freight rates would have been totally inapplicable here.

The aggregate number of employees was 897,293, which is at the rate of 15.5 per mile of line. During the same year the aggregate number of employees on railroads in the United States was 1,189,315, which is at the rate of only 5.94 per mile. The work done by the two systems per employee was 21,616 passenger-miles and 33,090 ton-miles on the German, and 16,556 passenger-miles and 132,253 ton-miles on the American; one-quarter less passenger business per employee here than there, but four times as much freight business. The gross earnings per employee were $1,451 here and $795 there. Retired employees and their widows and children received $20,000,000 in pensions, besides which the railroads in the German Union paid out about $12,500,000 to pension, relief and invalid funds; and the capital of these funds at the end of the year was about $80,000,000, which is nearly $90 per employee. The payments for the year under these heads amounted to an average of $36 per employee, which must be taken into account when the low European wages are considered.

Railroad Gross Earnings for July.

Gross earnings for July are somewhat disappointing after the showing made by most of the railroads in June, when it appeared as though traffic conditions were gradually improving. For the month, 82 railroads report a decrease of $4,306,589 over July of last year. As each month appears, some new factor seems to arise to reduce revenues and tonnage. In April the trouble was caused by the strike of the pilots on the Great Lakes, in May it was the strikes in Colorado, while in June, adverse weather conditions in the west played a prominent part in the falling off of earnings. Shortly after the first week in July, when the traffic situation appeared to be regaining its natural condition, the beef-packing strike began in Chicago and the middle west. This has served to seriously interfere with the tonnage and revenues of the railroads, not only in the immediate vicinity of the strike, but also in the West, South and Northwest. In the first place, this strike has reduced the shipments of live stock by nearly 50 per cent. Live stock receipts at the Chicago market for three weeks subsequent to the strike numbered 9,710 cars, and shipments amounted to 3,815 cars. For the corresponding period last year, the figures were 17,096 cars and 4,585 cars, the decrease amounting, in the first case, to 43 per cent., and in the second case to 17 per cent. The strike also reduced the shipments of dressed beef 44 per cent.; canned meats, 16 per cent.; other meats, 11 per cent.; barreled pork, 43 per cent., and beef packages, 56 per cent. This falling off in shipments has affected chiefly the East and West trunk lines from Chicago, and it is in this group that the largest decrease in earnings are recorded. For the month of July, seven railroads in the trunk-line group show a decrease of $1,591,041. The traffic situation in the Southwest is also unsatisfactory, owing to bad weather and damage to crops, which has caused a heavy falling off in grain shipments. In this vicinity, nine railroads show a decrease for the month of $1,177,373. Reports from the various other sections of the country are as follows: Anthracite group (four railroads), decrease $1,207,029; Northern & North Pacific group (12 railroads), decrease $58,660; Middle and Middle Western group (13 railroads), decrease $40,383, and Southern group (nine railroads), increase $2,275.

In analyzing the gross earnings of the separate railroads for the month, it should be remembered that, in many cases, the decrease is not as large as was the increase during the same month last year, when traffic was unusually heavy. This shows that, although earnings appear small when compared with those of last year, they are, in many cases, quite normal. It should also be taken into consideration that a more conservative policy has been adopted by many railroads, so that operating expenses have been accordingly reduced, making net earnings, as a whole, satisfactory. The largest decrease for the month is made by the Reading Company, where a loss of $1,157,642 is recorded. Other heavy decreases are as follows: Atchison, Topeka & Santa Fe, $643,757; Baltimore & Ohio, $589,925; Erie, $497,807, and New York Central & Hudson River, $405,846. In the latter case, however, the loss is only about half of the increase made last July, which amounted to $812,627. Encouraging reports are shown by the Canadian Pacific, with a gain for the month of $318,656; Chesapeake & Ohio, with an increase of $100,128; Southern, with $98,493; St. Louis Southwestern, $89,444; Great Northern, $86,691; Wabash, $81,996; Missouri, Kansas & Texas, $61,295; Pere Marquette, $60,824, and Illinois Central, with $58,276.

TRADE CATALOGUES.

The Railway Appliance Company, Chicago, has issued catalogue No. 112, illustrating and describing the Oldsmobile railroad inspection car and its use on steam and electric roads, with details of parts, weight, capacity, speed, etc.

The Hancock Inspirator Company, New York, issues a small pamphlet which describes its type "E" inspirator for locomotives, and contains much information concerning their use for feeding locomotive boilers. Tables, charts, and a diagram of parts with price list of each part are also given.

Gould & Eberhardt, Newark, N. J., send a catalogue descriptive of their shapers and shaper attachments. A detailed description and illustrations of these machines are given. There are also a number of interesting illustrations which show different methods of clamping work to the table while being machined.

The Consolidated Car-Heating Company, Albany, N. Y., issues a catalogue descriptive of the different styles of electric heaters which it makes. Diagrams of wiring show the proper method of connecting up the heaters. Up to date the company has equipped over 18,400 cars, involving the use of more than 175,000 electric heaters.

The American Balanced Valve Company, Jersey Shore, Pa., issues booklet Nos. 21 and 22 with illustrations. The first-named describes the use and advantages of piston valves for locomotives, and the other describes double-acting slide valves, including their use under high pressure and their efficiency in preventing leakages.

The Laidlaw-Dunn-Gordon Co., New York, issues Bulletin L-601, 6 x 9 in., with illustrations facing each reading page, describing the Meyer-gear pumping engines for small water works and elevators. These engines are built on the cross-compound and three-cylinder compound types, with fork frames. It is claimed that their steam consumption is about one-half that of the best types of direct-acting compound pumps.

The Haberkorn Engine Company, Fort Wayne, Ind., has issued a catalogue describing the Haberkorn engine. Special attention is called to the valve mechanism which is designed so as to avoid all compression in the cylinder except as desired for cushion. Two piston valves are used. It is claimed that the engines give Corliss fuel economy at two or more times Corliss speed, and occupy one-half the floor space.

CONTRIBUTIONS

Draft of Baltic.

Aguascalientes, Mexico, Aug. 20, 1904.

To the Editor of the Railroad Gazette:

Will you kindly inform your readers what is the draft of the new steamer Baltic when fully loaded, and also what the depth over the bar at entrance of New York Bay is?

BEN JOHNSON.

The maximum draft of the Baltic is 36 ft. 6 in. At present, vessels drawing 32 ft. may leave or enter New York harbor at high water, but otherwise the limit of draft is 30 ft. The Government is now engaged on an extensive plan of channel dredging, but it will probably be several years before the Baltic can load to her full capacity.—Editor.

The Schenectady Locomotive Superheater.

The American Locomotive Company has brought out a new locomotive superheater, designed by Mr. F. J. Cole, Mechanical Engineer of the company. It is to be known as the "Schenectady" superheater and has been applied to the New York Central Atlantic type (4-4-2) passenger engine No. 2,915, now in regular service on the Mohawk Division between Albany and Syracuse, N. Y. The objectionable features of previous locomotive superheaters, both abroad and in this country, have been, first, the use of bent tubes, and, second, the necessity of dismantling the whole superheater in order to get access to a single leaky boiler tube. As shown by the accompanying illustrations it has been the aim to eliminate these difficulties.

The first new feature of construction is in the T pipe, the regular conventional T pipe being replaced by one of special design. This T pipe is subdivided into two compartments by a horizontal partition, and it extends nearly across the smoke-box. Steam which enters the T pipe from the dry pipe is admitted to the upper compartment only. To the front side of the T pipe are attached 11 header castings, the joint being made with copper wire gasket, as in steam chest practice. Each header casting is also subdivided

into two compartments, but in this case by a vertical partition. Five pipes or flues of $1^1/_{16}$ in. outside diameter are inserted through holes (subsequently closed by plugs) in the front wall of each header casting. These $1^1/_{16}$ in. tubes are first expanded into special plugs, and then firmly screwed into the vertical partition wall. Each $1^1/_{16}$ in. tube is enclosed by a 1¾ in. tube which is expanded into the rear wall of the header casting in the usual way; each nest of two tubes (one $1^1/_{16}$ in. and one 1¾ in.) is encased by a regular 3 in. boiler tube, which is expanded into the front and back tube sheets. The back end of each $1^1/_{16}$ in. tube is left open, and the back end of each 1¾ in. tube is closed, the back ends of the two tubes being at a point about 36 in. forward from the back flue sheet. The detail arrangement and grouping of the three flues is shown by figure 3. The back end of the 1¾ in. tube is closed by welding, and the tail is formed so as to support this tube in the upper part of the 3 in. tube, thus leaving a clear space below. Fig. 1 shows that the $1^1/_{16}$ in. tubes

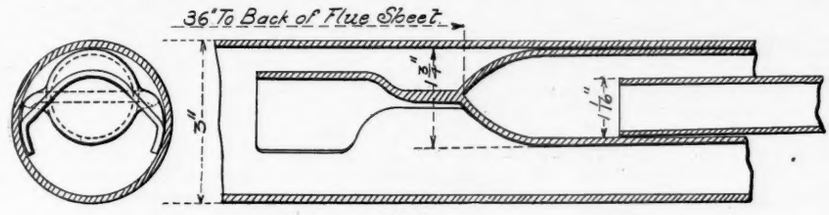


Fig. 3.

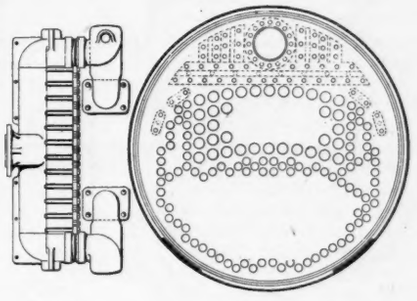


Fig. 4. Fig. 5.

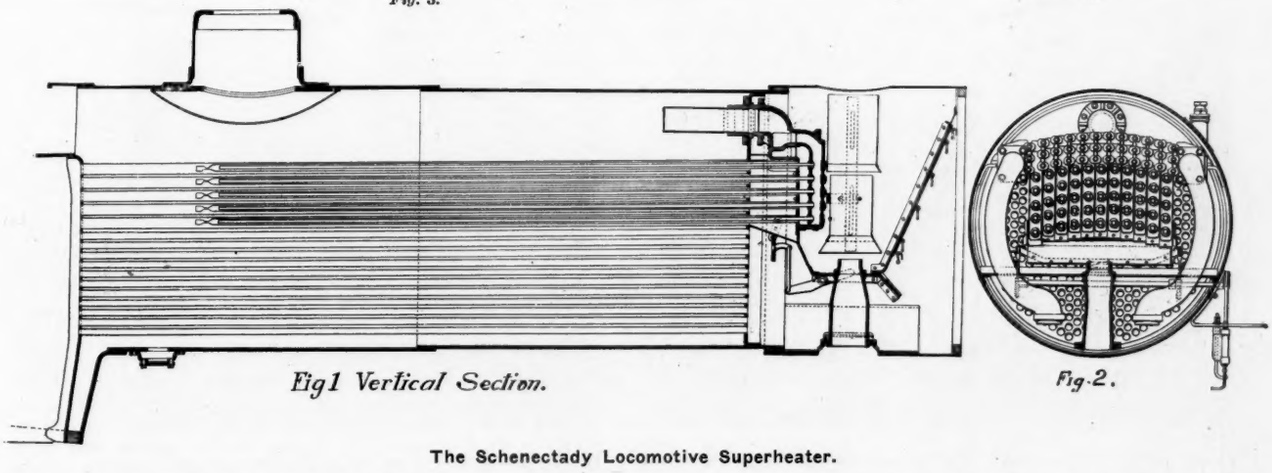


Fig 1 Vertical Section. Fig. 2.

The Schenectady Locomotive Superheater.

are concentric with the 1¾ in. tubes at their back ends, but the fact is the $1^1/_{16}$ in. tube is allowed to drop and rest on the bottom of the 1¾ in. tube, as shown by Fig. 3.

Steam from the dry pipe enters the upper compartment of the T pipe and then enters the forward compartments of each of the 11 header castings, after which it passes back through each of the 55—$1^1/_{16}$ in. tubes and then forward through the annular spaces between the $1^1/_{16}$ in. tubes and the 1¾ in. tubes to the rear compartments of each of the 11 header castings. The steam then passes into the lower compartment of the T pipe, and then, by the right and left steam pipes, to the cylinders. In passing forward through the 1¾ in. tubes the steam is superheated by the smoke-box gases and products of combustion passing through the 3 in. tubes. In this particular design 55—3 in. tubes are inserted in the upper part of the flue sheets, thus displacing as many of the regular smaller tubes as would occupy the same space. The arrangement of flues is shown by Fig. 5.

In applying the superheater to a locomotive it is necessary to provide some means of protecting the superheater tubes from excessive heat when steam is not being passed through them. This is accomplished by an automatic damper, shown in Figs. 1 and 2. That portion of the smoke-box below the T pipe and back of the header casting, is completely enclosed by metal plates, and the lower part of this enclosed box is provided with a damper which is automatic in action. Whenever the throttle is opened and steam is admitted to the steam chests the piston of the automatic damper cylinder (shown in Fig. 2) is forced upwards and the damper is held open, but when the throttle is closed the vertical spring immediately back of the automatic damper cylinder (and concealed by it in Fig. 2) brings the damper to its closed position, so that heat is not drawn through the 3 in. tubes when the engine is not using steam. In this way the superheater tubes are effectively prevented from being burned. In introducing the group of 3 in. tubes and applying the superheater, there is a slight loss of heating surface, but it is more than offset, as regards economical results by the superheating process. The heating surfaces of the regular New York Central Atlantic engine and the sister engine which is fitted with the superheater, are shown by the following table:

Heating Surface (sq. ft.).

	Engine		
	Regular.	Superheater.	Per cent.
Fire box	175.0	175.0	0.0
Fire tubes	3248.1	2837.0	12.6
Arch pipes	23.0	23.0	0.0
Totals	3446.1	3035.0	11.9

The application of the superheater reduces the heating surface of the fire tubes by 12.6 per cent., and reduces the total heating surface by 11.9 per cent. The actual superheating surface is 301 sq. ft., which is 10.6 per cent. of the fire tube heating surface, and 9.9 per cent. of the total heating surface of the superheater engine. A pyrometer is inserted in the left steam pipe, as shown in Fig. 2. Readings from this pyrometer since the engine has been in service, show that the average temperature is about 517 deg. Fahrenheit, the boiler pressure being 200 lbs. per sq. in., which corresponds to a temperature of 387 deg. Fahrenheit. A superheating of 130 deg, is thus obtained.

Service tests on the Canadian Pacific with a superheater locomotive showed savings (on the ton mile basis) of 33 per cent. in fuel consumption, as compared with a similar simple engine, and 16 per cent. as compared with a similar compound engine, when the performance was reduced to the same unit of comparison.

The piston rod metallic packings are made of a special mixture (which, in this particular case is a mixture melting at about 1,200 deg. Fah) to guarantee that they will not be unfavorably affected by the excess heat in the cylinder.

When superheated steam is used no chances can be taken as regards lubrication of the cylinders, and, therefore, forced feed is used instead of the usual gravity feed. It is probable that the constant temperature of the cylinder walls, when steam is being used, is about 385 deg., which, however, is considerably higher than the corresponding temperature in the case of an engine not equipped with a superheater.

The forced feed lubricator used is of German make, and consists of four reservoirs which are filled with oil before the beginning of the run, the oil being forced out of these reservoirs through connecting pipes to the cylinders, by plungers which receive a gradual but constant downward impulse by a screw motion, which is actuated by a system of levers connected with a return crank on one of the rear driving wheels. In this case two oil pipes are led forward from the lubricator to each side of the engine. One of each pair of oil pipes enters the live steam passage through the cylinder saddle, and the other is led directly into the cylinder at the middle of the stroke.

Casual consideration of this design might lead to the prediction that the upper of 3 in. tubes would be likely to choke up in service; but the annular space in the lower part of these 3 in. tubes is quite free and unobstructed and can easily be reached and scoured by a steam jet from the fire-box end. The upper flues, however, are not as likely to choke up as the lower flues.

A Practical Method of Adjusting Suspension Bridge Cables.*

It is always a difficult problem in the erection of a short span cable suspension bridge in which the cables are made up of groups of separate ropes to adjust the length of each rope so that it will carry its calculated proportion of the total load on the cable and to provide for the necessary camber to the bridge under full working load. It can be shown that the error in dip is greater than the error in cable length producing it, and as it is the dip which is required to be accurate, it is the dip that ought to be measured, not the cable length. It can also be shown that the curve of a rope is not sufficiently defined to admit of accurate measurement of the dip by tangential observation, unless the rope is uniformly loaded so as to produce a fair curve free from wave, and to eliminate sag beyond the towers. While it is manifestly out of the question to apply such a uniform load during erection as would give the desired result, a central load can be used which will not only give a similar result, but will admit of the necessary measurements being made with great accuracy and with all possible sources of error eliminated.

This method was adopted in erecting a 250 ft. span over the Kangaroo river, New South Wales, in the following manner: The saddles on the towers having been wedged in a central position and greased, a rope was drawn into position, permanently fastened to its anchorage-bolt at one end, and temporarily to that at the other, care being taken that the temporary fastening was made in a similar manner to the permanent one. The rope was allowed to hang between the towers in a curve having a dip of a foot or two less than that required, but no care was taken to obtain a particular dip. A weight of 4.36 tons was placed in the bed of the river (which was dry at the time) under the center of the rope, and, a snatch-block having been placed upon the rope, the weight was connected to it and lifted slightly off the ground. The effect of the weight of 4.36 tons was to draw the rope into a series of practically straight lines, under a stress of 12.22 tons (equal to that produced by the dead load), and to take up the slack in the fastenings and anchorages, as well as the sag beyond the towers, the waves in the rope, and the extension due to dead load. In order that the rope should be of the correct length, it was only necessary that the portion of it forming two straight lines from the tops of the towers to the snatch-block in the center should be equal to the calculated length of the curve in a vertical plane under the dead load, viz., 256.89 ft., or, in other words, that the center of the rope should be 22.93 ft. below its level at the top of the towers, Fig. 2. This, of course, would not be the case on the first trial. It will therefore be supposed that the dip to the snatch-block was found on observation to be 1 ft. too much, or 23.93 ft.; the length of rope between the towers, as determined by calculation, would then be 257.24 ft. as against 256.89 ft. required, the rope being thus 0.35 ft. too long. It would, therefore, only be necessary to release the weight, take up 0.35 ft. on the rope, make the fastening permanent, and apply the central weight again as a check to complete the operation.

That this system of adjustment is capable of producing very accurate results is well shown by the foregoing example, the small error of 0.35 ft. in the length of the rope producing a whole foot of dip, the error being multiplied by three at the point of observation. Indeed, the only reason for not getting the rope exact after the first trial is that some allowance has to be made for yield, or want of accuracy in making permanent the connection of the rope at the end which is temporarily fastened during the test. In erecting Kangaroo river bridge any small error found on second application of the weight was taken up by the tension-screws, but after experience had been gained in fixing the first two ropes it was not found necessary to move the screws more than about one thread, so little indeed that they might well have been dispensed with. There is a certain inaccuracy in assuming the several lines of rope under the action of the central weight to be straight lines; they are, of course, very flat curves; further the point of application of the weight is not a point, but a curve dependent upon the size of the sheave of the snatch-block used to suspend the weight. These inaccuracies are inappreciable, and, being common to all the ropes, are of no account, especially as any sag in the ropes beyond the towers when under the adjusting-weight remains equally under the dead load in the completed bridge.

With regard to temperature, correction may be made by calculation, but it is best to assume a temperature readily obtainable at some portion of the 24 hours, to fix the

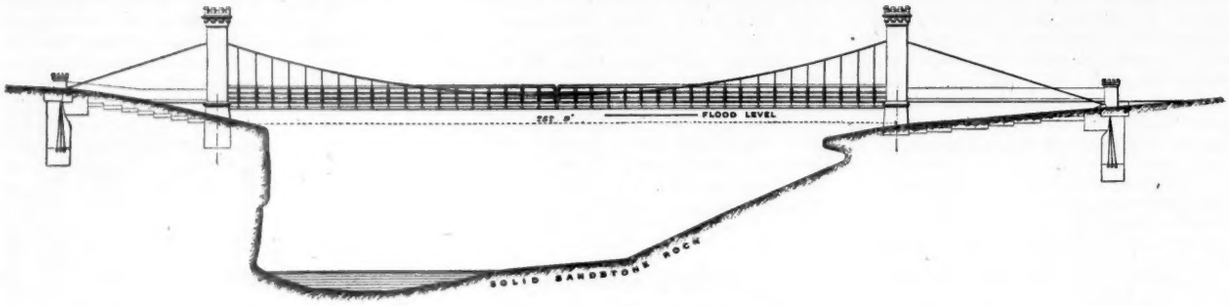


Fig. 1—Kangaroo River Bridge.

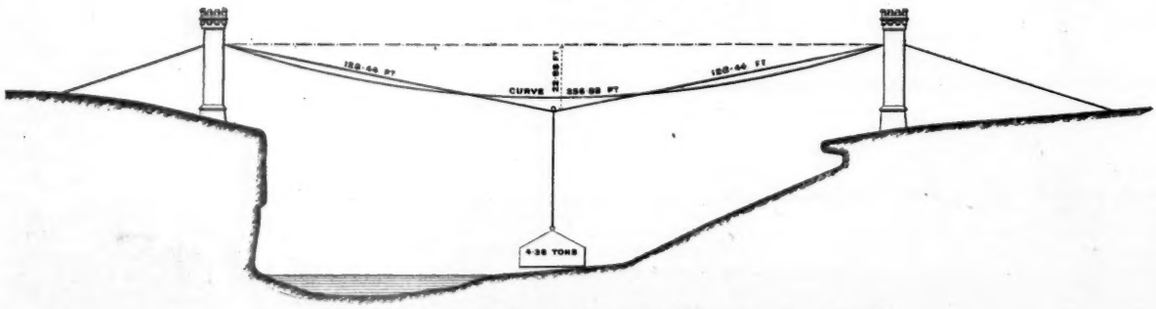


Fig. 2—Method of Loading Test Cable to Determine the Proper Dip.

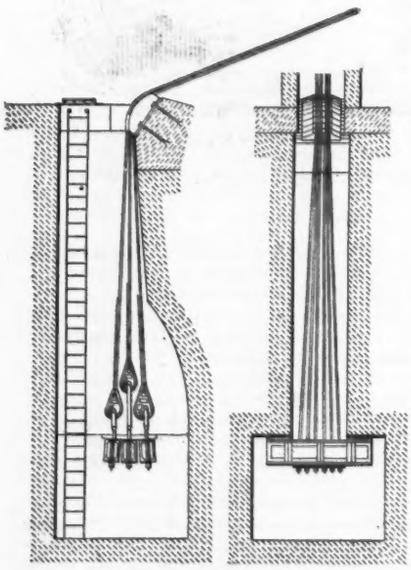


Fig. 3—Kangaroo River Bridge Anchorage.

Fig. 4—Section of Cable.

*Extract from a paper by E. M. de Burgh, M. Inst. C. E., published in the Proceedings of the Institution of Civil Engineers, Vol. CLVI., 1904.

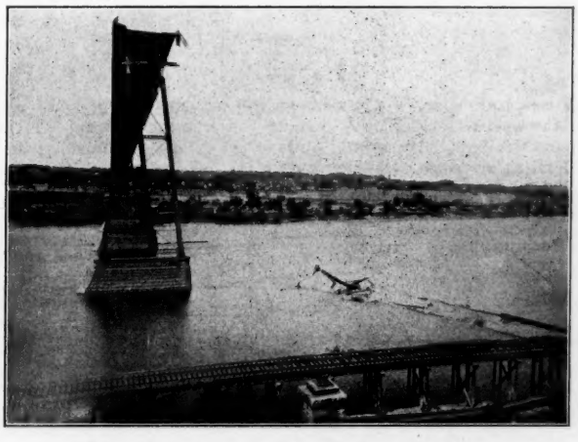
expansion-rollers, and to work to that temperature with each rope. A certain temperature may generally be relied upon to recur twice in each 24 hours, and it is better to wait for it than to test one rope in a very hot sun (when the temperature of the steel is really not known) and another in the cool of morning or evening, and attempt to bring them into line by calculation; indeed, it will be found better not to test ropes at all with the mid-day sun shining on them.

In dealing with cases in which the portions of the cables behind the towers support portions of the bridge the same method of adjustment is applicable, but the difference in length (calculated) between a straight line from the top of the tower to the anchorage-saddle and the length of the required curve must be added to the calculated length of rope to be drawn into the center span by the test-weight; and lengths equal to this should be measured from the centers of the towers towards the central weight and accurately marked upon the rope while under test. If on the removal of the test-weight the ropes are then clipped with these marks over the centers of the tower-saddles the lengths will be correct for each span.

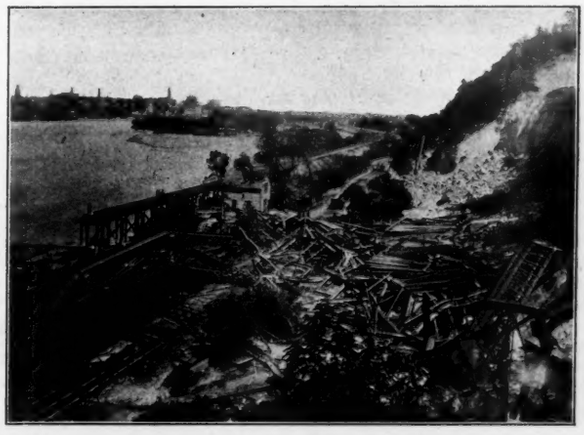
Bridge Wrecked by Cyclone at St. Paul.

The cyclone which struck St. Paul and Minneapolis on the evening of Saturday, August 20, destroyed property valued at more than a million dollars and caused the death of 12 persons. The storm cut a pathway about a half mile wide and eight miles long through the business and residence district of St. Paul and did considerable damage in Minneapolis across the river. A theatre on the edge of the river was completely demolished and several members of the audience were killed and injured. As the storm swept up the river valley it struck the High Bridge across the Mississippi at Smith avenue and carried away two 60-ft. plate girder approach spans on the right-hand bank, one 170-ft. span, a trestle tower carrying a 50-ft. span and one 250-ft. span. This bridge, which was built in 1889, is one of the most noteworthy structures in the Northwest. It has a total length of 2,770 ft., with a 24-ft. roadway and two side-walks 8 ft. wide. The bridge starts from the bluff on the left bank of the river at an elevation of 90 ft. above low water, and is built on an ascending 4 per cent. grade to the bluff on the opposite side, where it reaches an elevation of 200 ft. above low water. It consists of four spans of 40-ft. plate girders, three spans of 50-ft. plate girders, two spans of 60-ft. plate girders, nine spans of 80-ft. riveted open web girders, five spans of 90-ft. riveted open web girders, one 170-ft. pin connected truss span, and four spans of 250-ft. pin connected trusses. The piers of the bridge are built of heavy masonry and are carried up from 5 to 10 ft. above high water. The trusses are carried on iron trestle towers and rocking bents of heights varying from 27 ft. to 118 ft. The floor system was designed with special regard to stiffness, so as to allow trotting on the bridge. The total cost of the bridge was $479,878, and the total weight of the iron in the bridge was 2,980 tons. The river channel is spanned by the four 250-ft. spans.

The 250-ft. span which was carried away fell into the river. The total weight of the iron that fell was about 500 tons, of which 267 tons lodged in the river. The cyclone came down the river, and the width of the cyclonic action at this point was not more than 100 to 150 ft. The storm evidently struck the tower and the end of the 250-ft. span, lifting the tower bodily from the masonry, breaking the 2-in. bolts with which it was anchored to the masonry, and threw it down stream. Falling from such a height, the iron work was, of course, twisted and bent in every direction, and it is impossible to make an estimate at the present time of how much of the material can be saved. The balance of the bridge was not injured in the least. Work has already been begun toward clearing away the wreckage and as soon as an estimate can be made of the salvage on the material in the wrecked spans, the contract will be let for replacing them.



High Bridge at St. Paul after the Storm.



Wrecked Spans on the Right Bank of the River.

We are indebted to Capt. L. W. Rundlett, Commissioner of Public Works, St. Paul, for the photographs and particulars of the above statement.

The Effect of Unions on Railroads.

The *New York Sun* prints the following, as an interview with a "prominent railroad official," whose name is not mentioned. Further comment on the subject is printed this week in the editorial column.

Undoubtedly fatalities have increased unduly in the last decade. And why? It is a puzzling question at first. Traffic has grown enormously, it is true; yet never before has so much thought, care and money been expended on safety appliances and devices. The factors which make for safety seem to have gone ahead of the factors which make for danger. The air-brake is now made compulsory by law. The use of vertical plane couplers and improved systems of signals is universal. Steel bridges have replaced the old, dangerous wooden trestles. Roadbeds are improved all along the line. We have devised better and smarter methods of railroading. And yet the accidents increase out of proportion to the increase of traffic.

Most railroad men will tell you, and rightly, that the fault lies with the employees. In spite of everything, discipline is lax. The tone of the men is deteriorating. There was a time, 20 or 25 years ago, when every railroad employee was right up on his toes trying to do the best he could, because promotion was on merit. As in Napoleon's army, every private carried a Marshal's baton in his knapsack. The railroad presidents and general managers of to-day came from the energetic and faithful trainmen of those days. But now promotion is not made on the basis of merit, but according to seniority.

The labor unions have done this. They have made seniority alone the basis of promotion. There is no chance now—at least on roads where the men are thoroughly organized—for a spectacular career. There is no chance to rise through alertness and faithfulness. And so the men have no interest except in getting the biggest day's pay for the smallest day's work.

Not only that; union men arrange among themselves to conceal from the company any small slip or lapse of duty. These things should be reported. Human life depends on weeding out stupid and unfaithful employees. But the men now shield one another and balk the officials in their efforts to hunt out incompetents or to place the blame for accidents. The men don't look upon the company as a friend and refuge, but as an oppressor. It is a reproach to be a "company man."

Unfortunately, the communities, especially the small ones, stand by the men in this attitude. It isn't the road that suffers from big wrecks; it is the public. It isn't the railroad official who gets killed in accidents; it is the ordinary citizen. They sow the wind when they stand by the unions, and they reap the whirlwind.

On the 6th of July a locomotive boiler exploded while standing on a station track in Paris with a violence rarely if ever equaled. It was reduced to so many fragments that it was difficult to recognize where any of them belonged, when investigating the cause of the explosion. It had come in with a train four hours before and was to go out three hours later. No one was on it at the time, but its engineer and fireman were on their way to it and near enough to be hurt, with 12 other persons, some of them in the streets at considerable distances. This was the first locomotive explosion on this railroad for 33 years.

The Ganz Rail Auto-Car.*

European railroads have been experimenting extensively with rail auto-cars for the purpose of improving the service and decreasing the cost of operation of branch lines, where, owing to the limited traffic, train service had been operated at a loss. In many cases it has been found that the cost of conducting transportation by the rail auto-car is one-fourth of the cost of train service. Experience has also shown that by establishing four runs each way with auto-cars as against one train each way and with reduced rates the net earnings can be doubled and in some cases even trebled. It has also been found that the use of auto-cars is responsible for a considerable saving in the cost of road maintenance owing to the absence of the unbalanced reciprocating parts of the locomotive.

The car shown in the accompanying illustrations is the design of Ganz & Company, of Budapest, and has met with much favor in Europe. There are cars now in use or under construction for the Hungarian State Railways, the Southern & Kassa-Oderberg Railways, the Russian railroads, the Servian State Railways, and others. The Bavarian State Railways were the first to decide on the general adoption of this car. The half-tone illustration (Fig. 1) shows a car built for the Servian State Railways. A typical floor plan is shown by Fig. 2.

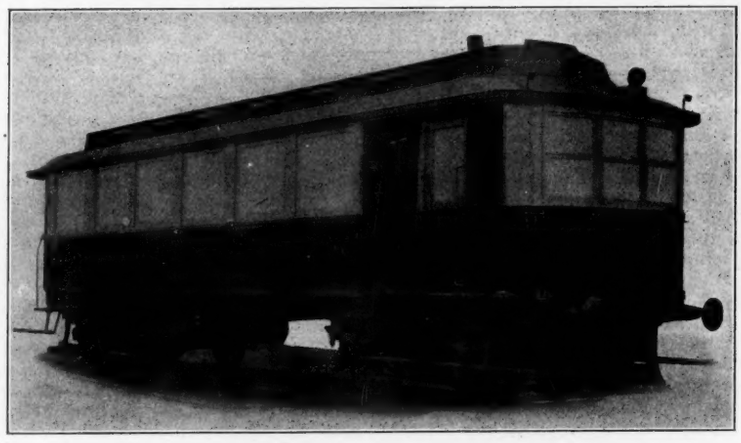


Fig. 1—Ganz Auto-Car for the Servian State Railways.

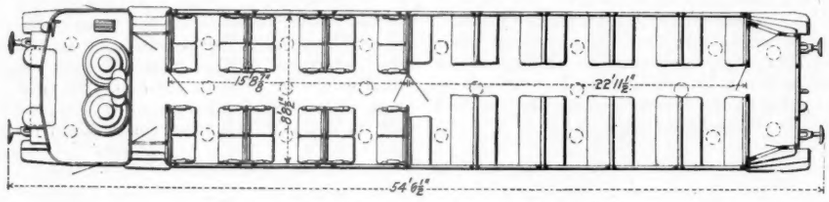


Fig. 2—Floor Plan—Ganz Auto-Car.

The steam generator of the Ganz car is shown in Fig. 3. These boilers are built in sizes from 35 to 80 h.p. each. They are applied singly up to 80 h.p., and when more power is needed, two boilers are used on the car. The boiler consists essentially of an outer and an inner annular water space connected by short water tubes. The coal is fed down through the hopper formed by the inner ring of the boiler and is burned on the grate below. The smoke-box and stack are built up over the annular space crossed by the water tubes. A live steam jet is provided for increasing the draft if necessary, but the exhaust from the cylinders is usually sufficient. The steam is slightly superheated on leaving the boiler.

The motors are built in sizes from 35 to 80 h.p. Up to 80 h.p. one motor is used and for greater power two motors are used. Each motor has compound cylinders. The motor is shown in Figs. 4 and 5. The motor drives the car axle through a differential gear having two speeds. Going up grade, half speed can be obtained without changing the speed of the motor. The frame of the motor is flexibly suspended at the cylinder end from the car frame. The gear box is air tight and is filled with oil. The motorman can control the motor without leaving his post. The control apparatus is shown in Fig. 6. In starting, both cylinders of the motor can be worked simple. The coal bunker is near the boiler and against the end partition of the car. The hopper can be filled from outside the car. The water tanks are suspended to the car frame. A feed pump of special design is used. A 100 h.p. car having two boilers and two 50 h.p. motors weighs, in working order, about 35 tons, and carries enough coal and water for a 50 mile run. The maximum speed on a level track is 46 miles an hour, and on a 1 per cent. grade the speed is 25 miles an hour. With a 26-ton trailer, the speed on a level track is 28 miles an hour, and on a 1 per cent. grade, the speed is 15 miles an hour. The coal consumption is from 8 to 14 lbs. per mile. The car has a seating capacity of 46 passengers and has a toilet, and a baggage, mail and express room.

The cost for conducting transportation and maintenance of equipment with auto-car service has been estimated as follows. On a basis of 200 miles service per day.

	Per mile.
For writing off capital outlay (Cost of car, including royalty)	5 cts.
Cost of repairs and renewals of mechanical parts	1.5 "
Cost of repairs of car body, couplers, brakes and trucks	2 "
Cost of fuel, lubricating and water	3 "
Cost of crew (1 motorman, 1 conductor, 1 trainman) making about 200 miles per day	5 "
Total, per mile	16.5 cts.

Considering the present cost of train service which, if the item of writing off the capital outlay is to be included, would amount to 60 cents per train mile, gives the

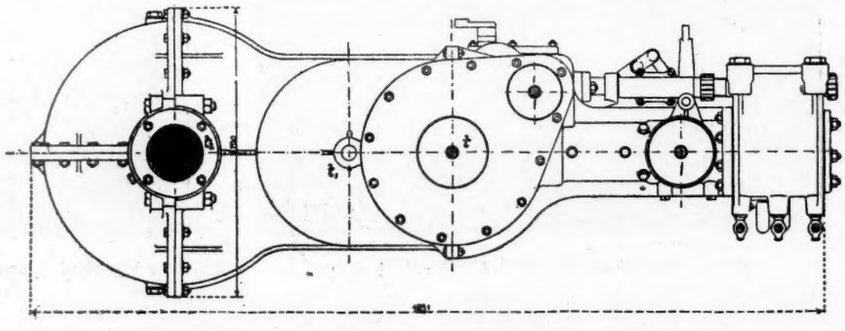


Fig. 4—Side Elevation of Steam Motor—Ganz Auto-Car.

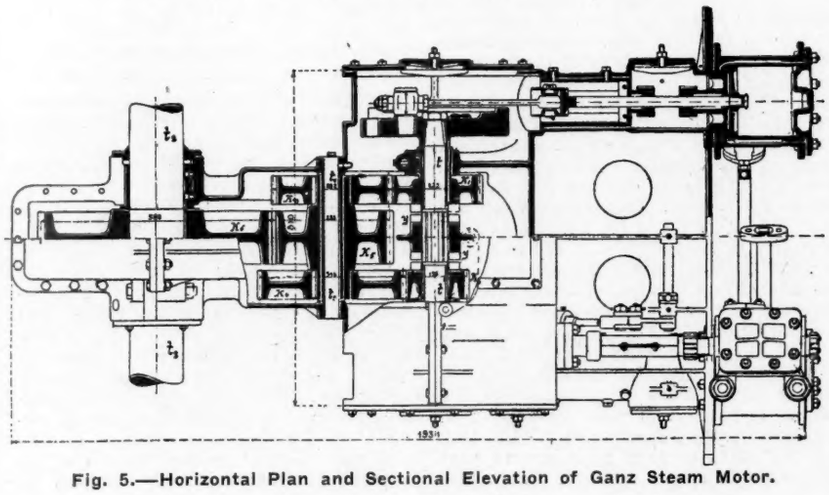


Fig. 5.—Horizontal Plan and Sectional Elevation of Ganz Steam Motor.

*The American rights of Ganz & Company are represented by Mr. G. Leve, 114 Liberty St., New York.

auto-car a great advantage for branch line and suburban service. There is no reason why small types could not be used on surface and interurban lines where the frequency is not sufficient to warrant the capital outlay for electric traction. Such small units could be operated at much reduced cost, not exceeding 10 cents per car mile.

The following statistics of a Hungarian branch line using the Ganz car may be interesting. Similar results have been obtained on a number of other lines. Auto-cars were used in 1903.

Year.	1899.	1900.	1901.	1902.	1903.
Number of trains	14	18	18	20	32
Number of passengers	371	791	889	1,190	1,904
Gross earnings, in kronen*	164.22	340.06	373.38	460.25	679.70
Earnings per train-kilometer, in kronen	.25	.44	.51	.43	.46
Earnings per passenger, in kronen	.67	.43	.42	.38	.35
Cost of transportation per train-kilometer, in kronen	.302	.302	.302	.302	.12

*1 krone is about 20 cents.

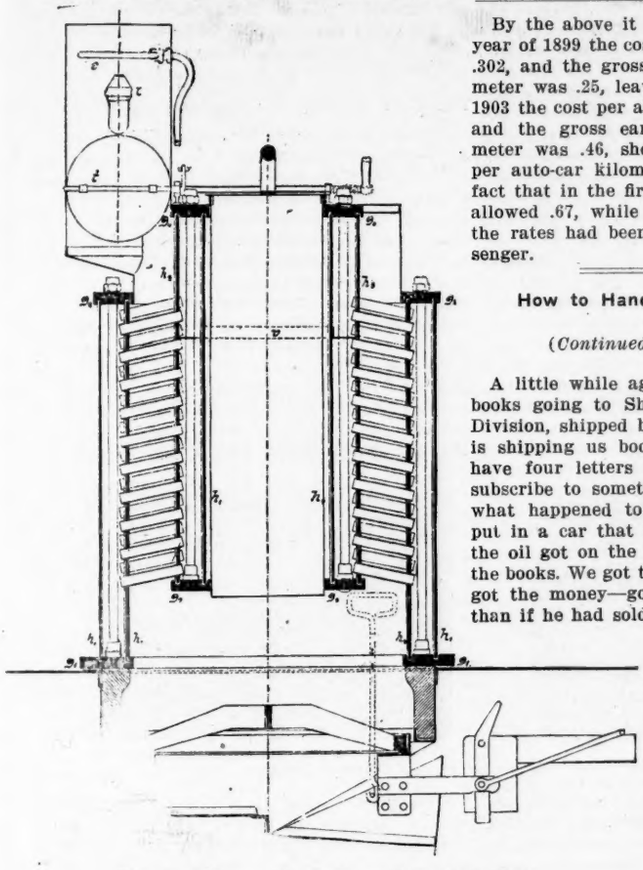


Fig. 3 —Steam Generator—Ganz Auto-Car.

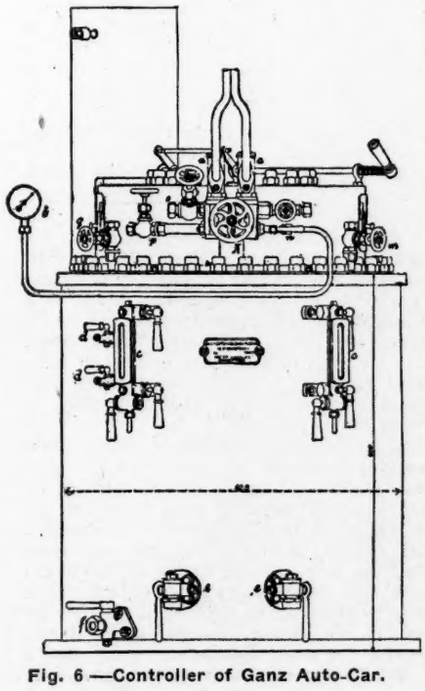


Fig. 6 —Controller of Ganz Auto-Car.

By the above it will be seen that for the year of 1899 the cost per train kilometer was .302, and the gross earnings per train kilometer was .25, leaving a deficit of .052. In 1903 the cost per auto-car kilometer was .12, and the gross earnings per auto-car kilometer was .46, showing a net profit of .34 per auto-car kilometer notwithstanding the fact that in the first case the rates in force allowed .67, while in 1903, using auto-cars, the rates had been lowered to .35 per passenger.

How to Handle Freight Safely.*

(*Continued from page* 287.)

A little while ago we had a shipment of books going to Sheboygan on the Ashland Division, shipped by John Wanamaker. He is shipping us books all the time. I now have four letters from him asking me to subscribe to something I can't read. Well, what happened to the books? They were put in a car that had oil in it. Of course, the oil got on the books and it got all over the books. We got the books and Wanamaker got the money—got it a good deal quicker than if he had sold the books to me. . . .

We always work better when watched occasionally, when somebody comes around to see whether we are doing our work right. Now, you gentlemen here who have men loading freight for you, if you will go into the cars in the morning and see that they are clean and go into them after they are loaded and see if they are properly loaded—you don't have to do it all the time, but just often enough to catch some one and you will catch them every time they do something wrong, then we will have this thing going right. Just give it the supervision that you would give your own business, just give it the supervision that you are paid for giving it. That is one of the things lacking on a railroad to-day. There isn't enough supervision. We don't have enough superintendents and a great many times where we have them—I say that without disrespect to any of the gentlemen here—where we do have them, they are not the right kind, but we do not have enough supervision. What we need is more inspectors, more superintendents. The pay roll would be a little higher but the loss and damage account would be a great deal less—if the supervision was the right kind.

On the Northern Wisconsin Division, you have some places where the cows have calves three or four times a year, and I think often they must be twins. Now, don't load those calves [veals] on top of butter. That is not the place for them. The butter tubs are all covered with blood, and the agent at destination has got to scrape those tubs and wash them off with water to clean them. Don't put the heavy boxes and packages on top all the time. Don't make a special effort to put machinery on flour or sacks of sugar and don't put it on automobiles. We had a shipment of an automobile the other day where a lot of agricultural implements had been loaded on top of it. The fellow that did it was sure the car would be sealed up and pulled out and put into some train. If he thought somebody was going to look into the car before it went out and find that the freight had been improperly loaded he would not have done that. And that was a $2,500 automobile. Automobiles are about as delicate a piece of property as we have to handle. See that they are properly braced in the car so they won't run from one end to the other and up the sides and knock the end out.

We receive a great deal of perishable freight, and we want to load it in a refrigerator. If you don't have any ice at your station and the stuff will spoil before it reaches the next icing station or destination, go and get some ice. Don't let the property spoil because you don't want to spend $2 or $3. If the Superintendent won't refund that amount I will. I will agree to pay for it every time. And in loading a refrigerator see that the waste pipes are open so that the water will run out of the car instead of into it.

Refrigerators in the winter time have vents; they have covers on the top where the ice is put in the bunkers. If you leave the pipes open the cold will get in there and if the car is going far enough it will freeze the contents. If you have a refrigerator car and there is a heater in it, see that it is burning and that it has enough oil in it to keep it going and carry it through to the next division terminal and don't turn the wick up too high. We lately had two cases of damage to butter. The stuff was so covered with soot and dirt that nobody would take it and we had to pay for it. We paid up to the first day of July $13,833 for damage to stuff by frost; and we have a lot more to pay for on claims that have not been settled, all because this refrigerator business is not properly handled.

We are having flour claims to beat the band. Claims for flour damaged by wet on account of being loaded into cars with leaky roofs. When an inspection of a car is made it should be made carefully and with a view of locating defects. There is no need of making an inspection if we do so to find everything all right. Only a short time ago a man was running a train on a certain road on double track. He was on the wrong track and didn't discover it until he had run ten miles. He was the best engineer they had, but that night he worked automatically and didn't think where he was going and a collision resulted. Frequently we make an inspection or do things in that way.

Sacked flour, when wet should be resacked. There is only a very little of it damaged around the edges that sticks to the sack. The damage don't get inside. If anyone tries to tell you a sack of flour is damaged to the extent of 50 cents or $1, don't you believe it. When you have any claims of that kind and the consignee won't take the flour and resack it, do it yourself. If you

*Extracts from an address by R. C. Richards, General Claim Agent of the Chicago & North Western, recently delivered at meetings of the agents of the company.

can't do it yourself hire somebody to do it, and if you can't get anyone to do it send the flour to me and I will have it resacked; but don't wait two or three weeks before you do it, because if you do the flour will become mouldy. It wants to be attended to right away—do it right off. Whenever we have a sack damaged in that way it amounts to about 10 cents, and we usually get a claim all the way from 50 cents to $1.50. Handle this flour just the same as we would handle it for ourselves, then you will be all right.

In the grain States the business of carrying the wheat, corn and oats will soon commence. Insist upon the elevator people patching up any leaky car before it is loaded, and if one man won't do it give the car to his competitor who will; then we won't have a continual stream of claims for grain leaking out of cars this winter.

But for goodness sake, examine cars to know whether they are loaded with grain before issuing receipts for them, and mark the receipts, "Shippers load and count." Don't do as Missouri Valley did with his car of corn.

Rule 65 says that when a shipment is delivered to us for transportation it becomes the property of the consignee. It don't belong to the shipper any more. If you get a request from the shipper or anyone else not to deliver it to the consignee or to deliver it to some other consignee, don't you do it, but notify me about it, and notify me right away because under certain circumstances the shipper has a right of *Stoppage in transitu* where he finds after the shipment has gone forward that the party has no money to pay for it or the goods were obtained in a fraudulent manner and that is why he wants the shipment stopped. Don't you do it, but notify me by wire. If there is any possibility of its getting to destination and being delivered before you can notify me and proper action can be taken, wire the agent at destination to hold it subject to my order. If you can't get a message off by railroad wire—sometimes it takes longer to get a telegram through than it would to walk—use the telephone, or if Sunday or a holiday is going to intervene and you can't reach me, or the agent at destination by railroad wire send a Western Union telegram, and charge it to the shipper. He will be glad to pay the charges to have his goods taken care of. If he won't pay for it, charge it to Richards, he will pay for it every time. If you can't reach me by telegraph use the telephone. And when the shipment is stopped we must not deliver it until the dispute is settled, because if we do it may turn out that the shipper did not have the right to stop it, and if we make a mistake in delivering those goods we have got to pay for it. We have pending now a claim of this kind for $700, the value of a carload of corn from River Sioux to Nashville. . . . We had a whole lot of claims last year on the A. Division for shipments delivered to somebody other than the consignee. . . . Always check packages when you make delivery, and know whether they are in good order or bad order; and you want to know that you are delivering it to the right consignee. If the consignee don't come himself and sends a drayman the drayman must have an order. Don't deliver it to the drayman without an order. A shipment of cigars going to Tracy was delivered to drayman and he receipted for them. The consignee says: I didn't get them or give an order. We show him his forgotten standing order, and we don't have to pay the claim. Now, it is just as necessary to preserve those standing orders as it is to take them. Because if we can't produce the order and the consignee comes to us and says he didn't get the stuff—he is going to lie about it—we will have to pay.

If you get bad orders, shorts or anything like that of large value, $50 or over, in addition to making your report, telegraph me about it. Make me get busy. A letter will always receive more prompt attention than a form. We handle about 4,000 pieces of mail a day. Just think of it. Just think of what it amounts to in a year.

If a shortage occurs and there is another railroad running into your town, inquire of the agent of the other railroad if he is over the property, as losses are frequently located in this way.

Rule 94 states that over freight when marked with the name of consignee and destination should be sent forward. That don't mean to put it in the freight house behind a lot of rubbish for a year or two and after the claim has been paid find it. It means that you should bill it out on a separate way-bill that day. I have no doubt in my mind, from looking around some of the freight houses, that some of you never saw that rule. . . . We try to keep the shorts and overs by commodities, not by names of the consignee.

Rule No. 118½ says if you get any piece of unmarked over freight you want to tag it. There is a wire on the tag, you need not get a string, and all you have got to do is to put it on. Show the car number from which received and the date received, and put it where it will be seen and not get torn off. If you don't get disposition for it in 30 days send it to division headquarters.

When you get a shipment that is refused, the first thing you want to do is to notify the billing agent. If it happens to be merchandise that can be sold only in a certain season, and the time for selling goes by, the first thing we know we get a claim for $400 or $500, the full value of the consignment. The shipper says: "You didn't tell me the stuff was refused and I didn't know it until I sent the consignee a bill." . . .

At the end of every month you are supposed to send in a list of stuff that is unclaimed and refused. Many that we receive are made up with great care and are of great assistance to us, but there is a whole lot that are of no account. They are taken from the expense bills in the cashier's desk and filled out.

We have a great many claims for damage to perishable freight because we do not notify the shippers. I recently had printed on the perishable way-bills: "Notify the billing agent by wire if shipment is not accepted in side of 24 hours." If you will do that we will do the rest. If you have any carload freight in penalty cars which is refused or which consignees do not unload promptly notify me.

You men who handle this freight in trains, when you get one-half of the car unloaded don't leave the rest of it four or five tiers high so that the first time the car is switched the freight will be sent to the other end of the car; we aren't paid for that additional ride. Break it down and fix it so it won't get spoiled or damaged. Handle it the same as you would your own, as if you were driving a dray. And when you have merchandise going to small stations and you don't have enough help and it is raining to beat the band, don't unload the stuff in the rain, but take it on to the next place and bring it back next day, because the chances are if the freight is unloaded in the rain it will all be damaged. Don't put pianos under the eaves of the freight house.

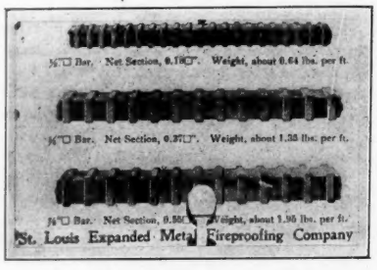
(To be continued.)

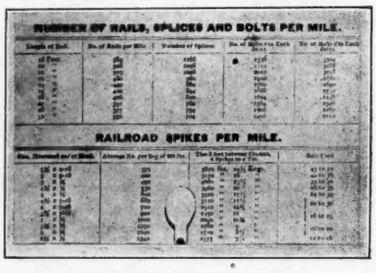
The Card System for Engineering Information.

BY G. R. WADSWORTH.

The advantage of the card over the book system for various forms of records has so often been elucidated that it is unnecessary here to dwell on the pros and cons of the case. The writer has for a number of years used with great satisfaction the card system for preserving engineering notes, clippings, etc., which are usually kept in note book or scrap book form.

A 3 x 5-in. card was adopted as being a convenient size, and wide enough to take a column of ordinary printed matter. Although this size seems small at first thought


Bar. Net Section, 0.18□". Weight, about 0.64 lbs. per ft.
Bar. Net Section, 0.37□". Weight, about 1.35 lbs. per ft.
Bar. Net Section, 0.55□". Weight, about 1.95 lbs. per ft.
St. Louis Expanded Metal Fireproofing Company



Specimen Cards, Engineering Card Index System.

with some ingenuity in the use of scissors, and in arrangement on the card, it will be found that considerable information can be crowded in the 3 x 5-in. space. The reverse of the card is of course available when cuts are large, and in some instances the accordeon fold may be used to reduce the size of a large cut. At all events it is the essence of the system to preserve the salient details in a logical arrangement within a small compass.

Engineering periodicals, trade publications, catalogues, etc., contain matter with accompanying cuts which are of more or less interest, and after the special features are taken out for the cards, the publication can be discarded, as a file of them soon assumes unwieldy proportions. Observations resulting from practice may be placed on the cards roughly at first, and afterward given to a stenographer and typewritten in neat shape. Prevailing prices for material and labor, also for work in place may be kept in tabulated form under the proper heading, and added to from time to time as further information is available.

In some engineering offices detail plans, working drawings, etc., are reduced by photography to a uniform smaller size sheet, and when blue prints of these reductions are accessible, it is often possible to obtain a copy of an assembled drawing not larger than the card size, and on the reverse of the card may be tabulated in detail the items, with contract prices which give the cost per unit of the part in question, which is convenient for future estimates.

Results may often be reduced to advantage

to a graphical representation, and for this purpose millimeter cross-section paper of the thin tracing paper type, pasted on to the card, or of the thick type pasted back to back may be used. Paragraphs or clauses for specifications, to apply in general or in particular instances may be written on cards and placed under appropriate headings, whence they are quickly available as guides in drafting specifications for new work, or they may be given to a stenographer to copy in toto. Standard practice in the way of detail design, when shown on cards in the way of a sketch or clipping from an illustration, may be turned over to the draftsman with instructions to follow the general idea. In short, information preserved in this form, although of a widely varying nature, is always perfectly classified and sub-classified, and is quickly available.

The accompanying illustrations of cards taken at random give an idea of the scope of photographic reductions which can be made of diverse kinds of material, without regard to typewritten cards and those filled out with pen and ink, as well as blue prints, which constitute a considerable part of the record.

Specifications.*

For convenience of reference and for clearness, specifications are usually divided into clauses, which may be classed as general and specific. General clauses refer to the business relations that shall exist between the parties to the contract. In them is found the general description of the work as a whole without any particular reference to details. Times and methods of making payments, adherence to specifications, inspection, and other analogous headings make up their subject matter. They should be comprehensive in their scope, and should not contradict one another. Contradictory clauses are sure to be a stumbling block that will create friction and delay. At first glance one would say that such clauses are easily eliminated, but care is necessary to accomplish this. For instance, a certain result may be desired in the substructure of a bridge that will not fit in with the kind of substructure wanted.

Specific clauses have to do with the details of construction and the description of particular features of design. They embody the special ideas that the engineer wishes to incorporate in the work, and they should be just as minute in detail as is requisite to set forth the exact plan desired. Detailed drawings may be necessary to indicate clearly just what is to be done, and these drawings either should be prepared before the specifications are written, or at least should be sufficiently matured in the mind of the engineer to enable him to write his specifications in accordance with them. It must be remembered that the specifications and plans constitute a guide book for the contractor and the resident engineer. They should tell what must be done, but should not necessarily state just how it should be done. Specifications should look to the accomplishment of an end rather than to the means of its attainment. Of course there are exceptions to this, as when the engineer believes that for the best results a thing must be performed in some particular way, in which case it is necessary to incorporate the method in the specifications. It must be remembered that under these circumstances the contractor cannot be held responsible for the mistakes of the engineer. When an engineer specifies that a thing shall be done in a certain way, he must assume the responsibility of the outcome, because the contractor is not free to adopt the method he thinks best suited to the case in hand. For this reason specifications should leave the method, as far as can be done consistently, to the contractor, and instead should dwell upon the end to be attained. A good contractor who is active and progressive may frequently wish to introduce methods of construction better than those conceived by the engineer, and it were a poor set of specifications which would prevent his doing so. A specification can readily be very strict concerning the finished work and at the same time very liberal as to the methods to be employed in its accomplishment.

It frequently happens that specifications are written without any accompanying plans at all. In such cases it is usual to require bidders to submit with their tender plans more or less detailed of what they propose to do. In this way the engineer may make a choice from various plans presented and thus obtain what he considers the best of a number of ideas. Specifications of this kind will have, of course, very little or nothing at all to do with the details involved, but will be concerned almost entirely with the final desired outcome. In other words, such a specification will consist very largely of general clauses, those of a specific nature being either entirely eliminated or reduced to a minimum. This method of letting contracts without any accompanying plans is by no means to be commended. A good engineer does not want other people to tell him what to use or what to do. If he is thorough and well posted in his profession, he is not going to let his own ideas be superseded by those of a contractor who furnishes plans with his bid. In such a case the engineer becomes only an inspector who simply passes upon the work and determines whether or not it fulfils requirements, when perhaps much of the work is entirely at variance with his own ideas. It is reasonable to suppose that an engineer who devotes his entire time to designing structures of a particular kind (and no one man will attempt to cover the entire field), is more capable of arriving at the best design for a given case than a contractor who is engaged in work of a varied nature, and who perhaps has given little or no thought to the designing of the particular kind of structure upon which he desires to tender. It is undoubtedly a fact that the best results are accomplished when the plans and specifications are prepared by a competent engineer, and when the bidder is governed by their requirements.

Let us consider some of the salient features of good specifications. Primarily, they should give a clear and concise description of the work, first when considered as a whole, and then in detail, no part being slighted in this description. It will not answer for the engineer to suppose that the contractor will do things as a matter of course, but he must produce a specification that will insure their being done. A contractor, if he be thoughtful and careful, will pay close attention to every detail set forth in the specifications; and he should make his bid expecting to fulfil just the requirements enumerated in them, no more and no less. If he be wise, he will not bid with the expectation of having them changed to conform to his convenience or his notions of what is best. The engineer is supposed to have stated in his specifications just what he wants; and no prudent contractor will tender, expecting his own ideas to prevail. If then upon the engineer devolves the responsibility of determining the work to be done, it will be readily seen that it behooves him to cover in his specifications the entire ground. He should give special attention to the point he intends to require absolutely without alteration, and should leave no possibility for doubt in the mind of the contractor as to what will be expected concerning them. He should be careful to set forth clearly the units of measure to be employed and what is to be considered a part of the finished work, as distinguished from what is merely accessory. If extra work is to be performed, the amount of which it is impossible to determine in advance, the greatest care should be exercised in defining clearly just what shall constitute such extra work and in fixing the compensation for it. Failure to do this is frequently a source of trouble and annoyance that might be avoided by careful wording.

Specifications should be designed to secure the best results consistent with what is considered good practice. It is possible to make requirements of such a nature that to fulfil them would mean an enormous outlay of money not at all proportionate to the result. Such clauses in a specification make a bidder uneasy and will cause him to add to his bid a sufficient amount in addition to his profit to insure him against loss. A bidder should make his tender expecting to comply with the conditions of the specifications, and expecting that his fellow bidders will do the same; and a clause that involves an unduly strict condition is liable to cause him either to tender high or to bid hoping that its fulfilment to the letter will not be demanded. In nine cases out of ten such a clause will be dearly paid for.

Absolute perfection is not to be expected, but the very best that the most approved practice will afford should govern the requirements. An engineer must lose prestige if he specify things which cannot consistently be done; and by inserting such requirements he works injury to all parties concerned. In the matter of materials to be used he must be governed by the locality and by what the market has to offer. He may be unable to get just what he would like, so he must use the best that can be obtained. These remarks do not imply that the engineer should be satisfied with any makeshift that is offered. He can rest assured that he will not receive anything better than he demands, and he is fortunate if he succeed in getting everything as good as he specifies.

Again, specifications should be written in simple, plain language without any attempt at rhetoric. All verbs should be complete, and no words should be omitted on the assumption that they are understood. Of course, the law will interpret a contract or a specification in accordance with what the court decides is its spirit, but an engineer should not rely upon this to guard against omission. Short sentences and simple words are preferred. Punctuation and grammar, while usually and erroneously considered of minor importance in an engineer's practice, certainly play an important part in this particular kind of literature. The meaning of a sentence can be easily distorted, or even entirely changed, by the placing of a comma. Do not fear to repeat the same words or phrases over and over again in your specifications, if you find they best convey the idea you have in mind. This may involve occasionally some lack of euphony, but that can very readily be dispensed with in writings of such a prosaic nature.

Should more than one contractor be employed upon a piece of work, great care must be exercised to define clearly the duties of each. Just where one is to finish and the other is to begin should be set forth so as to leave no possibility of doubt. When prac-

*Extract from a lecture delivered to the senior class of the Rensselaer Polytechnic Institute by J. A. L. Waddell, D. Sc., LL.D.

ticable in such cases, separate and distinct specifications for the different parts of the work should be prepared. Care should be taken that the same thing is not required of both contractors, and that one contractor is to leave his part of the work in such shape as to involve no hardship or inconvenience for the one who is to follow. As an illustration of cases of this kind, in bridge work it frequently happens that one contractor will do the substructure work while another will build the superstructure. It is then necessary to specify who is to set the anchor bolts and anchorages.

Another point about which the engineer must be careful is the putting of anything into his specifications that has even the appearance of favoritism. He must be constantly on his guard to avoid this; for his position is such that his reputation is liable to suffer if he deviate in the least from strict fairness to all. It is bad policy, generally speaking, to require a particular brand of material or the product of a given firm without stating that other material will be accepted, if, upon testing, it be found of equal quality. When a given brand is well known and has an established reputation, it is sometimes proper to specify that it shall be used to the exclusion of other makes; but usually it is best to set a standard which is commensurate with the best product to be had, and then accept any brand which meets the requirements. An exception to this rule is permissible when specifying paint for metal work, because, unless the particular brand be stated, the contractor is liable to give endless trouble by offering for test inferior brands; and the result is very likely to be the adoption of a paint that is not really satisfactory. Unscrupulous parties are ever ready to give the engineer a bonus in case he use their product, and that engineer is fortunate who has an extensive practice and is yet entirely free from all charges of peccability. Where one man's product is rejected and another's used, there is a great temptation on the part of the disappointed person to question the fairness of the proceeding.

To insure all the conditions that have been enumerated, it is evident that the engineer must familiarize himself with every detail of the work in hand. If he does not understand it himself, it is certain that he will not succeed in getting a clear idea of what he wants into the mind of another. Even when the scheme is perfected in the engineer's mind, it is difficult sometimes to make it plain to the contractor.

It will not do to jump at hasty conclusions, for very often one finds that an idea, which at first seemed to be just what was wanted, proves utterly untenable when considered in connection with other ideas that must be incorporated in order to produce a finished construction. No idea for a specification has any value until it has been fitted into the proposed structure, and is found to harmonize with all the other requirements.

It is usual and proper in specifications to insert a clause allowing the engineer the privilege of changing them or the plans as the work progresses; but it is desirable for all concerned that the number of these changes be reduced to a minimum. A perfect set of specifications would render such a clause useless; but since we have not yet attained to perfection, we must have some means of recourse, bearing in mind, however, that the more such a clause as the one referred to it brought into use, the farther we are from the ideal.

The question of precision is one which should never be lost from sight. If the engineer is to maintain his prestige, he must be precise. It will not do for him to say "about this" or "about that"; for the "about" is very liable to assume proportions which were never dreamed of when the term was used. Of course there are times when it is neither necessary nor desirable to be absolutely exact in requirements; but generally speaking the word "about" has very little place in a set of specifications. What is put into them is placed there with the idea that it is to be operative and binding in the construction of the work; and it is the duty of the engineer first of all to impose no impossible or unwise conditions, and next to see that what he has required is fulfilled to the letter.

The specifications form a part of the contract, and when the latter is signed, the contractor agrees to all the conditions they set forth. It is proper to assume that he has read the specifications and is familiar with their requirements, and that he signs the contract and makes his bond with the full knowledge of what is before him. A specification should never hide from the contractor difficulties that are likely to be encountered. On the contrary, when such difficulties are known to the engineer, they should be specially called to the contractor's notice, so that he may bid more intelligently. His attention, however, should not be drawn to them in such a way as to frighten him and to cause him to make a bid abnormally high; but the facts as they exist and are known to the engineer should be stated. As in all relations in life, straightforward, fair-and-square dealing is by far the best policy. No railroad company or other corporation is benefited by letting a contract for a sum below the actual cost with a reasonable percentage for profit, since the delays incident to the contractor's failure, and the litigation that is likely to arise, will more than counterbalance the supposed saving. No contractor who is losing money is going to make the same exertion to accomplish his task properly as one who realizes that he is earning a fair profit.

In spite of every precaution that may be taken, it is almost impossible to avoid mistakes entirely. To reduce them to a minimum, the engineer must be thoroughly conversant with all contingencies likely to arise in the execution of the work. He should familiarize himself with the appliances ordinarily employed, and should so design his work that their use be not prohibited. In writing his specifications and in making the plans, he should have a clear and complete mental picture of just what he is striving to attain. It must be remembered that if the specifications are lived up to, they will determine entirely the result, and that it is the plans and specifications wherein the creative power of the engineer asserts itself. Finally, when all is said and done, common sense must govern the interpretation and execution of any set of specifications. All should have but one object in view, the production of a structure that will be a credit to everyone concerned.

Jubilee of the North-Eastern Railway.

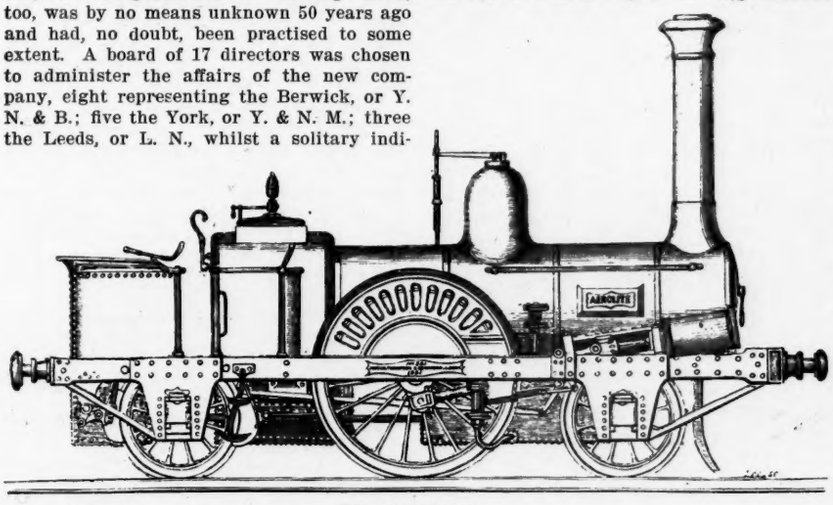
BY W. B. PALEY.

On the 31st of July the North-Eastern Railway, now and for many years past the third longest line in Great Britain, completed the first half century of its existence under that title. A curiously local system at all times, unaggressive, monopolistic, yet popular in its district, the North-Eastern is seldom heard of except between the Humber and the Tweed. To most Londoners its name is quite unfamiliar. Half of them go down to Scotland by it but they begin the journey on the Great Northern and end it on some Scotch line, so that the "middle passage" over the longest link of the chain leaves no impression on their minds.

The line, as it stands to-day, represents the fifth of those great amalgamations of English railroads of which the Midland, under the able leadership of George Hudson, was the first. We gave a sketch of the history of that undertaking on June 3 last. The present London & North-Western, London, Brighton & South Coast, and Lancashire and Yorkshire companies followed, as the result of combinations effected, the two former in 1846, the latter in 1847. In each case the result was satisfactory, and at last it became evident that a similar policy must be carried out in the great district between Leeds, Hull, and the Scotch frontier. Here a number of separate companies were at work, forming by no means a very happy family, each being perpetually afraid that its neighbor would combine with some other line to ruin it. For a long time no means of effecting a proper balance of power could be found. but at last the York & North Midland, and the Leeds Northern agreed to combine with the York, Newcastle & Berwick, and to dissolve and cease to exist as separate companies. The last named then changed its title to that of The North-Eastern Railway Company. The example of the Midland was followed and preliminary joint working had been tried since April 1, 1853, to see how the various interests were affected and obtain a clear idea of what arrangements as to traffic would be needed. As in that case this proved most useful and had a material effect in popularizing the new scheme with the traveling public. Each of the three lines named was in itself more or less of an amalgamation. Into the history of each it is unnecessary to enter. Suffice it to say that the name of the former well describes its geographical position. The York & North Midland, originally only a line 23 miles long from York to the North Midland at Normanton, had developed largely in the Whitby, Scarborough and Hull districts into a system 263 miles long. The Leeds Northern, formerly the Leeds & Thirsk, had been exactly what its name implied, but latterly, forming a scissors crossing of the York, Newcastle & Berwick at Northallerton, had got into the Stockton district. It was therefore a competitor with the larger company, but was itself only 70 miles long. The Y. N. & B. having 330 miles open for traffic the joint concern formed a remarkably compact system of 663 miles. About 100 miles of the Y. N. & B. section consisted of colliery branches, mostly in Durham, and of these some 70 miles were worked by wire ropes as self-acting inclines or by stationary engines. Such ropes were then very expensive, the wear and tear costing £7,000 or £8,000 a year. Some of these inclines dated from 40 or 50 years before and were very interesting specimens of engineering. They are still in use here and there, many of the older pits being on the tops of hills. The loaded trucks going down pulled up a fresh supply of empty ones, but on the Whitby & Pickering section of the Y. & N. M. a water-balance system was used in one place for nearly a mile in the working of general traffic of all kinds. This line was opened in 1836 and was about the last public railroad built for horse-traction. In 1847, Mr. Hudson, then chairman of the York & North Midland, altered it for locomotive working and employed a stationary engine and wire rope instead of the water-balance. A heavy incline-van with "sledge" brakes acting on the rails was used behind the trains, in case the rope broke. It did break one frosty day in 1864, when the "sledge" brake proved inefficient and allowed a train to rush to the bottom, where it upset and killed two pas-

sengers. A deviation with easier grades was then made and the branch is now wholly worked by locomotive power.

A small company called The Malton & Driffield Junction, whose line united two important sections of the Y. & N. M., joined the new confederation on Oct. 28, 1854, but was evidently not of much account, for it was settled that from 1855 the receipts of the North-Eastern should be apportioned as follows, namely, to the "Berwick" shareholders 57.1 per cent.; to the "York" shareholders 32.9 per cent., whilst the "Leeds" got the remaining 10 per cent. This arrangement endured till 1870. The three companies had spent, at the date of the amalgamation, roughly 7½, 5½ and 2½ millions sterling respectively, the actual total being £15,611,000, but a number of loans and other obligations made the actual amount upon which interest had to be paid about £20,160,000. The gentle art of "watering" stock, too, was by no means unknown 50 years ago and had, no doubt, been practised to some extent. A board of 17 directors was chosen to administer the affairs of the new company, eight representing the Berwick, or Y. N. & B.; five the York, or Y. & N. M.; three the Leeds, or L. N., whilst a solitary individual looked after the small interests of the Malton & Driffield. Mr. James Pulleine, who had been chairman of the Berwick Company, was appointed to the same office on the North-Eastern, headquarters being fixed, where they still are, at York. The present board comprises 20 members, practically all, as they should be, local men. At the date of the union all three companies were in an unsatisfactory financial condition. The two larger ones, of which George Hudson, the founder of the Midland, had at one time been chairman, had been splendidly successful under him. Extraordinary economy in working was one of the secrets of his railroad successes, but it was secured by starving the properties (and the men too) and placing as much as possible to capital account. Sooner or later his system must have broken down. For the year 1848, the last in which he controlled either line, the Berwick paid 7 per cent., and the York 10, and had done so ever since 1842. When Hudson came to the ground in 1849, both companies fell with him, for in that year they paid 1⅜ and 1 per cent., respectively. It must have been a glorious time for the "bears"! By 1853, however, affairs had so far improved that they paid the one 3½, the other 2¼ per cent. The Leeds Northern had always been more or less of a failure.



The Aerolite.*

*The engine Aerolite was built for the Leeds Northern Railway in 1851, and was shown at the Great Exhibition in London, of that year. It had cylinders 11x22, 6-ft. drivers, 3½-ft. carrying wheels. The boiler contained 105 tubes, 1⅞-in. in diameter, giving 536 sq. ft. of heating surface. The firebox gave 62 ft. more, or a total of 598 sq. ft. The 2 tanks carried 495 gallons of water in all, and the bunker 10 cwt. of coke; the total weight, full, being 19 tons, 42,560 lbs. The engine was built for running light fast trains, but was broken up a long while ago. The hook-shaped regulator handle will be noticed, and the absence of sand pipes.

Dividends continued to be paid by the North-Eastern on the capitals of the three companies in the proportions named till the end of 1869, when they were receiving 6½, 6¼, 4$^{9}/_{16}$ respectively as dividend. Meanwhile some other important lines had been absorbed and a fresh arrangement became necessary. The principal new partners were the old Newcastle & Carlisle, and Stockton & Darlington Companies. The latter's name is too well-known from its association with George Stephenson to need description now; of the former, more anon. A new stock termed North-Eastern Consolidated Ordinary (briefly known as N. E. Consols) was created in 1870, in return for £100 of Berwick stock the shareholders got £100 of Consols, York £100 holders obtained £98, Leeds £65, Carlisle £133, Darlington £136, and Malton & Driffield £10. At Dec. 31, 1903, the amount of N. E. Consols in existence was £30,700,000 out of a total capital of 74½ millions.

The Newcastle & Carlisle Railway obtained its Act on May 22, 1829, or some months before the celebrated trials of locomotives at Rainhill. It was really that event, or rather the opening of the Liverpool & Manchester Railway in 1830, which showed what steam traction could do, consequently we find that by Clause V. of the N. & C. R. Act it is further enacted, "That no locomotive or movable steam engine shall be used on the said railways or tramroads for drawing wagons or other carriages, or for any purpose whatsoever," while even stationary engines were prohibited within view of eight specified country residences, some of which commanded a very long view indeed. However, before the line was well commenced, the L. & M. was opened, and a new Act allowed the use of locomotive engines. The N. & C. was 60 miles long, 40 of which were double line from the first, while the rest was widened before long. Nearly the whole was originally laid with stone blocks, wrought-iron 15 ft. rails, rolled with five fish-bellies, and weighing only 42 lbs. per yard, resting in small chairs. Part of the line was opened so early as March, 1835, the whole being completed from the Gateshead side of the Tyne at Newcastle in 1838, and from Newcastle itself in 1839. The line is an interesting specimen of early construction, and running through much beautiful country is well worth inspection, more especially towards the Carlisle end. The trains used to run on the right-hand road till the N. E. R. took over the working, after the company was amalgamated with its big neighbor in 1862. The Clarence Railway in Durham, the Taff Vale in South Wales, and the London & Greenwich were the only other lines in Great Britain, it is believed, where this practice obtained. In the latter case it was continued till only three years ago.

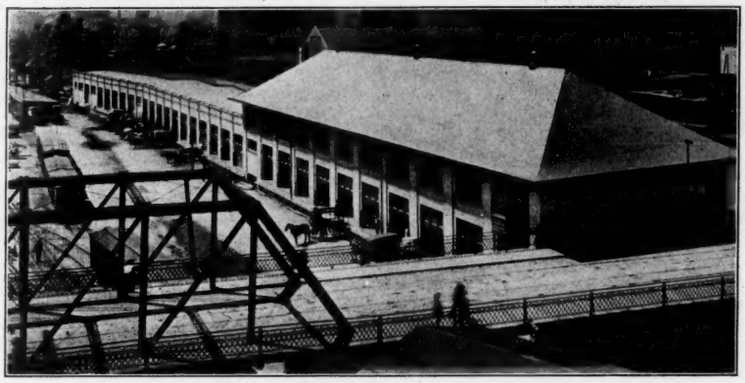
The directors congratulated themselves at their first meeting, Aug. 30, 1854, that the amalgamation had been carried through without the insertion of any stipulations injurious to the company, and without any sacrifices being made for disarming opposition in Parliament. The working to the end of that year was not very encouraging, the large increase in receipts of £86,000 being swallowed up in additional expense, due to 8 per cent. extra mileage run, to a great rise in prices caused by the war in the Crimea, and to very heavy expenditure in renewing and standardizing the permanent way. However, things soon settled down to a course of steady prosperity and the average dividend since 1870 has been 6.85 per cent. The early seventies were the hey-day of the North-Eastern's fortunes, from 8½ to 9¼ per cent. being paid time after time, whilst N. E. Consols stood for years at higher prices than the ordinary stocks of any other great line.

The North-Eastern has never been specially distinguished for high speed. Except the through Scotch traffic, none of its business requires exceptional rapidity. In 1854, however, its down night mail was said to be the fastest train of its kind in the country, doing the 84 miles between York & Newcastle (by the route then followed) in 135 minutes, with four stops. At that time the rolling stock consisted of 371 engines, 705 passenger coaches, 3,564 goods wagons, and about 14,000 coal trucks. Of these 10,000 were the small hopper wagons locally called, from holding only 53 cwts. "chaldron wagons." Coal was commonly measured in the district then by the "Newcastle chaldron" of 53 cwts., but the "London chaldron" was only half that quantity. Such wagons had 3 ft. wheels with inside bearings, wooden frames, and sides and ends curving outwards. They were only used for local traffic, weighing but 44 cwts. and being unsuitable for traction by locomotives of more than very limited power. Main-line rolling stock was provided with extra buffers of wood to suit the chaldron wagons, a few of which may still be found on the colliery lines.

It might be supposed that the North-Eastern's rich traffic ground would be a constant temptation to other companies to try for a share of it, but the only serious attempt of the kind, the opening of the Hull & Barnsley Railway in 1885, has not been successful enough to encourage further attempts. Only the broad and shallow Humber protects the company in this quarter, elsewhere their great monopoly, the Durham & Newcastle country, is too far off to be profitably attacked, while its coal is mostly used locally or sent short distances for shipment. The N. E. R. owns docks at Hull, Middlesborough, Hartlepool and Jarrow, which help to swell the capital to the great total of £74½ millions, at which it stood at the end of 1903. At the same period the rolling stock had increased from the figures given before to 2,142 engines, 3,218 coaches, and about 100,000 goods and coal wagons. The system comprised then 1,669½ miles of railroad, all but 41½ of which was absolutely owned. Of the total, 1,100 miles were double line, and 500 single. Foreign lines to the extent of 233½ miles, in addition to the above, were worked over, North-Eastern engines making during 1903 some 28,350,000 miles, a little more than half of which was with passenger trains. As the gross receipts of the joint working for the first half of 1854 were £742,000, and for the six months last ended £4,415,000, it follows that while the mileage open is 2½ times greater than it then was, the railroad earns six times as much. It is remarkable that, both then and now, the receipts are nearly equally divided between the passenger, goods, and mineral traffic.

Chicago Freight Houses of the Baltimore & Ohio.

The new inbound freight house of the Baltimore & Ohio at Chicago, although not the largest in the city, is in many respects one of the most convenient. It is located on Polk street, quite close to the Chicago river, and extends back, parallel to the latter, 570 ft. A platform at the south end makes the total length 670 ft. For 400 ft. of its length the building is 51 ft. wide. The last 170 ft. of the west wall is curved to the east in conformity with the river bank, the width at the south end being 24 ft. 2 in. The north end for 200 ft. is two stories high, the second story being for the offices of the freight department.

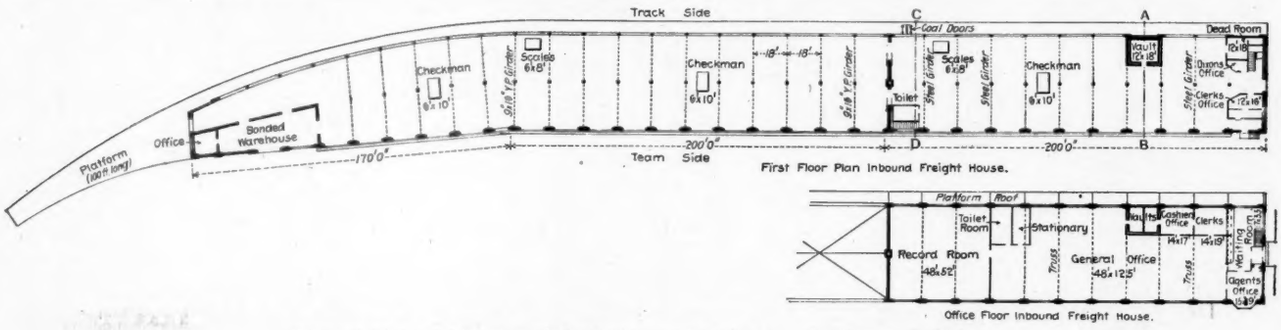


Baltimore & Ohio Inbound Freight House, Chicago.

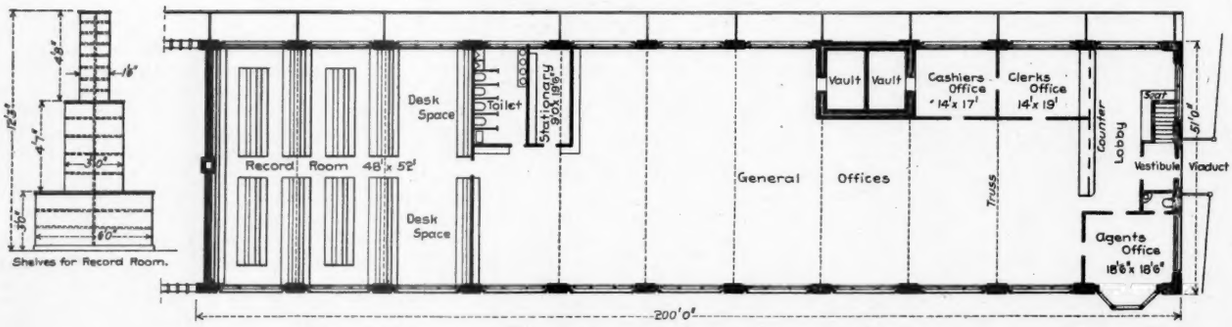
The building is brick on concrete foundations. The roof of the office section is slate, that of the remainder being gravel. Between foundation walls there is a solid filling of sand to within 6 in. of their tops, the remaining space being filled with cinders in which are bedded 4-in. x 6-in. sleepers, 3 ft. on centers. To these are nailed 2¾-in. x 8-in. hemlock boards, over which are laid tarred wool felt and on this 1⅛-in. dressed and matched maple flooring. The roof of the one-story section rests on 5-in. x 16-in. yellow pine girders supported on the east side of the building by the brick walls and at the middle and on the west side on I-beam columns. This latter side, which is the track house is the location of the offices at the north end of the general freight room, making it unnecessary to go to the general office upstairs to transact detail business. At one of these offices teamsters may pay their freight charges and receive their delivery tickets, while at another bills for transfer freight are handled. The dead room at the northwest corner has slat walls so that its contents may readily be seen at any time. The vault is convenient to the offices. It is 11 ft. 6 in. x 15 ft. 6 in., with cement floor, and it extends into the second story. At the south end of the house is the bonded warehouse with office for the government officer. This office is elevated so as to allow the use of all of the floor space. The room is enclosed with brick walls and is practically fireproof. The distribution of the freight on the floor of the general freight room is such as to leave an aisle on each side, instead of through the center. This avoids any chance of the freight piling up against the walls and hiding pieces, causing loss of time in looking for them.

The general offices occupy all of the second floor except 52 ft. at the south end, which is used for a record room. These offices are light and pleasant and contain room for double the force that will occupy them at the outset. They are entered directly from the Polk street viaduct crossing the railroad yards, and also by stairways from the first floor. The agent's office at the northeast corner has a bay window from which he can see at any time the condition of business along the team side of the building. A complete desk telephone system is installed so that every clerk needing one in the transaction of business has it close at hand. Roomy ventilated lockers are provided for the office force. They are ranged along the walls of the toilet and stationary rooms in the southwest corner of the office.

The record room has storage room for five



General Plan of Inbound Freight House at Chicago —Baltimore & Ohio.



Plan of Office Floor, Baltimore & Ohio Freight House at Chicago.

side of the building, has a continuous door system, the opening between columns, which are 18 ft. on centers, being closed by 17-ft. Variety horizontal folding doors. There is a 6-ft. platform on this side, protected by a roof supported by rods from the building wall. On the east, or team, side the Variety doors are 12 ft. wide. There is room for two teams at each door, or 56 teams in all can load at one time. A wheel guard, made of 8-in. x 12-in. white oak faced with an 8-in. channel and supported by cast-iron brackets bolted to the concrete foundation, protects the latter from injury from the wheels.

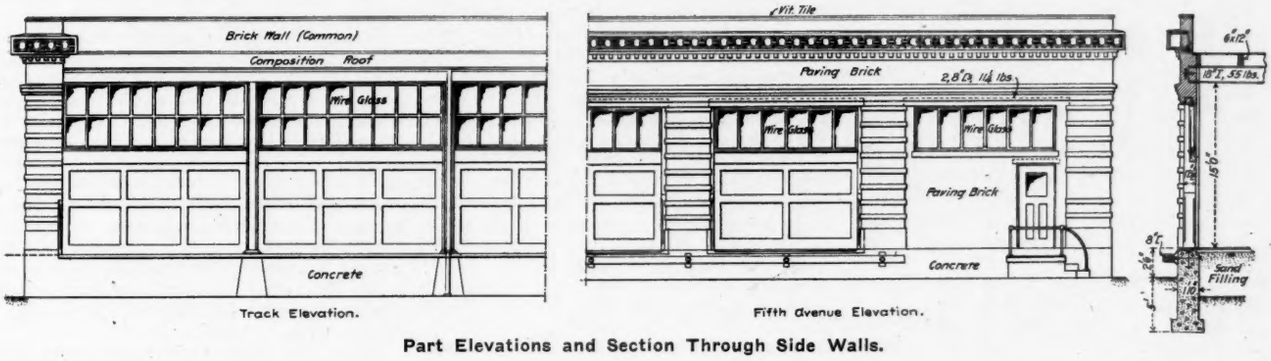
The general freight room is divided into two parts by the south wall of the two-story part. One of the conveniences of the year's records. Additional space is available above the offices, under the roof. Shelving built in conformity with the record system used on the B. & O. is placed in the room as shown in the plan. The two sets along the north wall are for current records, there being room for eight months' daily records. The compartments are each made just the size for a daily record book and are numbered for the days of the month. Any clerk wanting the records for a particular day can put his hand on the book at once. By this system as many clerks as there are books for the month can be looking up back records for that month without delaying one another. As the "current" shelves fill up, their contents will be moved over, a month at a time,

to the storage shelves. A sketch of one of the latter is shown.

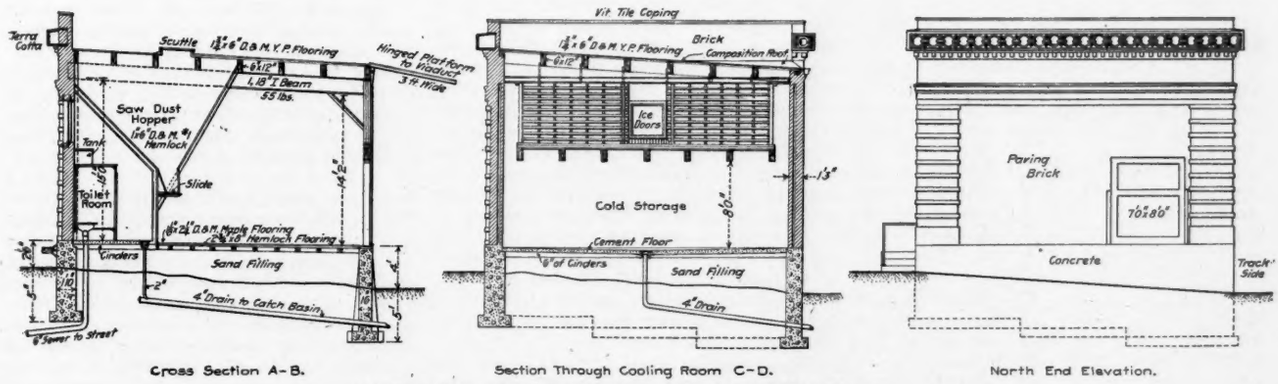
The foundations and walls of the building are designed for a three-story structure. When the need for this additional room arises, a viaduct will be built on one side of the building connecting with the Polk street viaduct, so that freight can be delivered direct from the second floor to teams, saving rehandling to the first floor and also increasing the delivery capacity of the house.

Plans are also completed for an outbound freight house to replace the present old and inadequate building. It will occupy the same site as the latter, with additional ground, the location being on the eastern side of the same square on which the inbound house stands. The distance between the two houses is about 300 ft. The outbound house will be 780 ft. long and 30 ft. wide. Its construction will, in general, be similar to the one-story part of the outbound house. However, its team side, which fronts Fifth avenue, is of considerably more ornate design than the corresponding side of the inbound house. This elevation is shown in the engraving. The walls will be of hard-burned paving brick with terra cotta cornice and window sills. Both ends of the building will also north wall. The roof will be supported on 18-in., 55-lb. I-beams, the slope being toward the track side. The west wall of the present building supports the east side of a viaduct connecting the Polk and Taylor street viaducts. The new building will be narrower and the work will therefore include placing steel column supports under the east side of this viaduct.

These stations are built for the Baltimore & Ohio by the Chicago Terminal Transfer Railroad, lessors of the B. & O. terminals. We are indebted to Mr. F. E. Paradis, Chief Engineer of the Chicago Terminal Transfer, and to Mr. T. E. Wayman, Freight Agent of the Baltimore & Ohio, for data.



Part Elevations and Section Through Side Walls.



End Elevation and Cross Sections of Freight House.

be finished to correspond to the Fifth avenue frontage.

A cooling room, 18 ft. 6 in. x 27 ft. 6 in., will occupy the extreme south end of the building. Ice will be delivered to it most conveniently from the adjacent Taylor street viaduct. A section through this room is shown, also through the sawdust hopper for storing sawdust for the floors of refrigerator cars, etc. The sawdust is delivered to the hopper through a scuttle in the roof, a viaduct along the western side of the building enabling wagons to be brought to within a few feet of the scuttle.

The floor of the house slopes from the east, or team, side toward the west for 17 ft. of the width of the building, the total fall being 6 in. It is level the remaining distance; also for the same width along the

Foreign Railroad Notes.

The organization of hospital trains at the seat of war in Manchuria has been established by order of the Czar. As a rule, they will consist of 16 cars, fitted to carry 250 sick or wounded; but only 10 of the cars are for patients; the others are occupied by the medical staff, the kitchen, refrigerator, stores, baggage, dispensary, operating room, baths and wash room. The medical staff consists of three surgeons, five sisters of mercy, five other nurses or assistants, and a variable number of servants. A number of mechanics accompany these trains, to make repairs where shops are not accessible. The Red Cross Society, other benevolent or patriotic societies, and private persons may provide and equip such trains in whole or in part; but in service the military authorities have sole control of them.

The Gotthard Railroad had its largest earnings last year, when they were 8¾ per cent. more than in 1902. The stockholders get a 6.8 per cent. dividend on their stock. The three countries which advanced a large part of the cost of the road get nothing, however. They are entitled to a share of the profits only after the stockholders have received 7 per cent. The Swiss government has the right to take over the road in 1909; and it gave notice last February that it will exercise that right, if an earlier transfer is not made by mutual agreement.

The war and the hasty building of the Circum-Baikal Railroad together have been giving the vessels on the lake and the several rivers which flow into it a rich harvest. Immense quantities of cement are required for the railroad, for carrying a given quantity of which the steamboats charged $12.50 a year ago; now they get $40 for it; and it is said that the contractor pays 29 cents apiece for carrying ties across the lake; very likely it is for carrying them down some of the rivers *and* across the lake.

It is reported that the various Russian railroad managements have authorized station masters when a passenger has lost his ticket or hand-baggage in consequence of a railroad accident to issue him a new ticket to destination and give money to live on till he arrives, at the rate of 1, 2 or 3 rubles a day, according to the class of his ticket. (The ruble is about half-a-dollar.) This will perhaps make railroad accidents popular; and they are not precisely rare now: the official statistics show 5,301 accidents in connection with the operation of the railroads in 1902 (when the Russian mileage was about one-seventh ours), by which 1,528 persons were killed and 3,773 injured. Of the killed, 121, and of the wounded, 600, were passengers.

Work has been suspended, and probably permanently, on the northern end of the Simplon Tunnel. More hot springs have been struck, and the drainage up-hill over the summit, which this end of the tunnel passed some months ago, is so difficult and costly that probably it will be left till reached from the south.

The Future of Interurban Electric Railways.

BY ERNEST GONZENBACH.

It should be unnecessary to point out that the above title has nothing to do with the future of electric traction. That future seems to be taking care of itself quite well. Again, electric traction, *per se*, is not likely to affect radically the future of interurban roads, as the latter seem to be working out their destinies with small regard for their origin.

For a proper estimate of the future we may look back to the beginning; say we find two populous towns connected by street cars, single track 20-footers with perhaps two 15 h.p. motors and the power down to lowest ebb half way between the two centers. The arrangement produces a new and steady stream of nickels. There is another center a longer distance away which looks promising and a line is built there, with not as good results as expected. Why? Because the trip consumes too much time. Re-enforcements in the shape of double truck cars and boosters remedy this condition, and the stream of receipts is again swelled—dimes this time, not nickels. All this is ancient history and has been recounted time and again. Now, does the prosperous and well satisfied street and suburban railway management branch out and build interurban lines through farming districts to other towns 20 or 30 miles away? Not in the least. It is rather a curious fact that in the majority of cases interurban roads have been promoted and built by men not connected in any way with the local and existing street railways and in many cases, even to-day such roads are owned and operated by comparatively new-comers in the railroad business.

Just who is entitled to the distinction of building the first strictly interurban road, it is difficult to decide. The ubiquitous Ohio man seems to lead in the race and modestly claims that not only was the first interurban road built in his State, but that it has more interurban mileage than any other State, Christian or heathen, in the whole wide world, all of which we will concede to him. The roads are here and here to stay, no matter who built them, and a glance at an interurban map is in itself a sermon on their future.

It is well understood that the largest percentage of interurban roads parallel existing steam lines, for the natural reason that the greatest density of population exists adjacent to steam roads and, *vice versa*, that steam roads exist adjacent to the greatest density of population. The steam road is there, and the people are there—there are luxurious trains and quick time and all the facilities for travel. And the people travel —when they have to. Did you ever hear a person say: "I have a little time to kill, come let's enjoy a ride on the Pennsylvania Limited?" Very likely not, and what is said about the pleasures of riding on "accommodation" trains would hardly make good advertising for the service, even if it passed the U. S. mails. It is quite apparent that the steam railroad does not cater to our natural born desires for transportation, it merely satisfies our necessities in that line, and that is where lies the secret of the success of the numerous electric roads. It is generally stated that the electric road "creates its own traffic," meaning, more exactly, that it rouses everywhere the latent traffic, by offering transportation which is at once pleasant and inexpensive.

On this basis then, the electric road should get about all the traffic there is, but it does not—for good and sufficient reasons. One cannot go everywhere on electrics—through service is nearly unknown, and most of all, a lost distance trip may require twice the time which the steam road demands. Granted that the electric road has a great advantage over the steam road in convenience and cost, we have still to improve our facilities by giving through service and quick time. When these conditions have been fully met, and our service can compete in every way with the steam service, then we may look for a most vigorous warfare and the invariable law of the survival of the fittest will begin to operate.

It is of course obvious that the electric road does not owe all its traffic to pleasure riding, but it is equally true that all of the short trip pleasure riding is done on the electric road and not on the steam roads. The lesson taught by the success of many of the interurban roads is, that the part of the public obliged to travel wants comfort, and when that is provided, the balance of the public will find an excuse to travel, if rates are reasonable.

To provide this comfort is not quite as easy as the word. It means more than handsome, well-appointed, easy-riding cars. Suppose these are provided and one must wade through muddy depths to get at them, or must undergo the annoyance of waiting for cars behind time, or endure a rough track and poor trucks; no amount of beauty in the car will make up for this. Comfort to the passenger should begin when he makes up his mind to take a ride on the road. He should have only a short walk to the car. Perhaps board it in front of his place of business, and it should be on time. Once seated, the car should get out of the way of impediments to quick time as promptly as possible. Getting to his destination, the passenger will want to be let off to his best advantage, and his comfort must be considered even after he is out of sight of the car. If it is not possible to pick him up and deposit him to suit his convenience, then the next best thing the road can do is to provide him with a comfortable and attractive place in which to wait. During his ride he does not want to stop oftener than can be helped; the speed of the car in miles per hour does not interest him, but he is vitally interested in the total elapsed time from the beginning to the end of his journey. Even if it is a pleasure ride and time does not count, he would rather ride 20 miles in one hour making no stops than the same distance in the same time making from 15 to 20 stops, but reaching a maximum speed between stops of 50 m.p.h. To be convinced of this try it yourself. Neither are hold-ups at grade crossings any additional comfort to the passenger—nor to the operating company.

This naturally brings forth the argument that, after all, one of the most vital parts of any railroad property lies in its terminal facilities, and the rule holds good whether the road have steam, electric, cable or mule motive power. This is especially true in the large cities, and no better illustrations can be cited than the two cities of New York and Chicago. The first is older than the railroads, which have up to the present time had insufficient terminals. Two roads alone are now spending something like a hundred million dollars to improve their facilities. There are some roads in this country and more abroad whose terminal facilities represent 20 per cent. and over of the value of the property. Chicago, on the other hand, grew up with the railroads, and we find terminals all around the periphery of a small circle not more than a mile in diameter and enclosing the heart of the business district. No such expenditures as those now being made in New York are there required to improve terminals. The electrification of the New York suburban service is quite liable to be followed by similar improvement in the magnificent suburban service offered in Chicago by the North Western and Illinois Central roads, and it is interesting to consider its effect on existing electric interurban properties, especially on the Aurora, Elgin & Chicago. The Aurora, Elgin & Chicago is a third-rail line about 35 miles long, competing with the Chicago & North Western, but tremendously handicapped in its terminal facilities. Besides interchanging with the West Side Elevated over a long and slow piece of elevated track, it has seven grade crossings with heavy-traffic electric and steam railroads, and something like 200 grade crossings with highways, many of them within Chicago city limits. Should the C. & N. W. at any time decide to follow the New York example and electrify its suburban service as far west as the Fox River Valley, there can be little doubt as to what would happen to the Aurora, Elgin & Chicago. In the smaller cities satisfactory terminal facilities are quite generally obtained with comparatively small trouble and at low cost, but it is safe to say that they are quite as important there as in the larger cities.

These arguments indicate that three things are essential for the success of any interurban property, good terminal facilities, permanent roadway and quick time. It is safe to say that this triple alliance will guarantee success wherever there is sufficient population to support a road. "Success" should here be defined as referring to an ample return on the actual, intrinsic value of the property. In these days of "high finance" a property may be bankrupt and in receiver's hands and still remain profitable, or its statements may indicate success and wealth, while beneath is demoralization and decay.

Within the past year Wall Street has grown exceedingly skeptical on the subject of interurban railways, and it has come to be the fashion to examine their promoters for evidence of milk on their boots and hayseed in their hair. Making all due allowances for the provincialism of New York in general and Wall Street in particular it cannot be denied that this attitude of the financial world is due to gross abuse of confidence by some railroad promoters. So long as there are people who build electric railways for the sake of a construction profit so long will this lack of confidence continue. There are some roads, more or less abandoned after completion, which went so far as to convert the underwriter's and promotors rake-offs into funded debt. One such electric road, capitalized for millions, after having an enormous bonded debt saddled on it, was put under the management of an ex-clerk with a few months experience in a railroad office, who was paid a salary about equal to the pay of a good mechanic. And to-day the "syndicate" which built that road is calling on Jehovah to witness the stringency of the money market which prevents them from raising the funds required to meet their necessities, a fact regretted by few who are familiar with the circumstances. Unfortunately a case like this can do more harm to the standing of interurban railways in the eyes of the investing public than 20 honestly financed and well managed properties can do good, and the weeding out process of this class of projects cannot commence too soon.

We are considering, however, the bona-fide, built-for-business kind of an interurban railway, and what is to become of it. Only a small percentage of them radiate from the

larger cities, the majority center in cities with a population under 500,000, where they have made serious inroads on the passenger traffic of the steam roads, and have developed transportation as a refined form of amusement for the masses. The millions of dollars paid annually into their coffers by the public is being regarded with envious eyes by the steam roads, who are bound, sooner or later, to make an effort to get some of the laboriously developed traffic of the electric, and it is still doubtful what form their onslaught on the business will take. Present indications are that some steam roads will add an electric passenger service in the vicinity of and connecting towns along their lines while maintaining their freight and through train service just as is done at present. There are many cases where this could be done without interfering with existing traffic, and in other cases an extra track or two can readily be built on the existing right of way. Such an electric service would steal a long march on interurbans, as on the well maintained roadway of the steam road running time could be made very far superior to the interurban schedule. And still the interurban will get the business, solely on the strength of its terminal facilities.

The next move of the steam road would be to so improve its terminal arrangements as to be able to run its electric passenger cars to the heart of the cities. To do this traffic arrangements may be entered into with street railways; they may be purchased outright, as at New Haven and at Syracuse; or the railroad may build its own track either on the surface of a street or on an elevated structure. While city governments, as a rule, are in no mood to grant privileges to steam railroads, the plan is workable. With this accomplished, the steam road becomes a very formidable competitor of the interurban for short haul traffic, and will no doubt get a share of its passengers. If an existing interurban does not parallel any steam road it is quite unlikely that it will ever be subjected to steam competition, and its returns would have to be something out of the ordinary to tempt investment in a parallel electric line. Both forms of competition will be quite out of the question if, as above outlined, terminal facilities are adequate, the roadway permanent, and the service as it should be in point of comfort and time.

So far, we have considered only the passenger traffic of the electric road. The future will no doubt see a greater development of freight service, but much is being done along these lines. The Toledo & Western, Buffalo & Lockport and Albany & Hudson are good examples of combined service, particularly the latter, because it has shown what a road can do in the line of heavy freight transportation, even if handicapped by 3 per cent. grades. Satisfactory freight returns depend to some extent on interchange of traffic with steam roads, but even without that, much can be accomplished if the business is handled right. The business should, however, receive consideration in planning the construction of the road and should not be an after-thought, grafted on a street railway construction. If the freight carrying and handling facilities are provided, the road which stands the best chance of success is naturally the one which opens new territory or new routes not touched by existing steam lines and does not come into competition with them. Such a road will always do a much heavier freight business than an electric road, which must win its share of traffic away from an existing steam road.

It is not the simplest thing in the world to handle a combined electric passenger and steam freight service over a single track road, but it can be done very satisfactorily by bringing to bear on the operating plans the highly developed and specialized modern system of railroad organization, and it is the best of business to keep the rails busy with revenue bearing loads of whatever nature every hour of the twenty-four.

Transportation securities will no doubt always hold their place in the favor of the public. Industrial corporations may come and go obedient to the shifting law of supply and demand and their securities will shift with this law, commanding fabulous prices to-day, down in the inky blackness to-morrow. But transportation must exist during good times and bad, war or peace, so long as there are people who demand communication with each other and transportation for their persons and goods. The extent to which electric railway securities can share in this general confidence will depend entirely on the skill displayed in financing, constructing and managing them. A high degree of strategy is just as valuable in railroad work as in warfare, but it will not win battles without the support of thorough organization, experience and loyalty to the work to be accomplished.

Applying to all that has been argued above, we may conclude that interurban electric railroads will work out their own destinies strictly in accordance with the amount of judgment which has been put into them. The road whose prosperous future seems most assured is the one which is located along a favorable route, constructed in a most permanent manner, equipped to handle freight on a modern scale and having the best terminal facilities for both freight and electric passenger service. For such a property competition, absorption and all the bugbears of modern finance can have no terrors, and if supplemented by skilful and experienced management it will survive as the fittest of them all.

Signal Batteries in Summer.*

BY H. S. BALLIET.

Previous articles have dealt with the maintenance of batteries during the winter; the principal thing being to prevent chilling or freezing. In summer the expansion of porcelain and glass and the evaporation of solutions are our chief trouble.

There is no uniformity of practice as to the use of either porcelain or glass jars in gravity batteries. Roads using porcelain claim that the breakage of jars in service is reduced to a minimum, very few interruptions being caused thereby. On the other hand, they agree that it is difficult to observe the action of the cell. This leads the maintainer, in an effort to save work, to take chances of having exhausted cells, dirty zincs or a dense solution. Many jars are broken and frequently small cracks started, afterward causing rupture when handled.

Experience indicates that it is economy to use porcelain for track batteries. Generally speaking, these cells are kept in chutes. In order that the highest standard may be maintained, they must have frequent inspection, usually once every two weeks, but this increases the liability to breakage, owing to the need of raising and lowering the jars.

When glass is used there is more breakage not only from lifting and lowering, but in handling them when renewing solution; but the action of the cell can be better watched and frequently a longer life maintained without danger of interruption by short circuits, dirty zincs or exhausted supply of sulphate of copper.

The question of broken jars is, however, not so serious where two cells in multiple are employed, with reasonably short track sections, as with three cells in series-multiple and long track sections. In the former the track relay will work when one cell is removed or broken, as only part of the source of supply is lost; while in the latter, the potential is reduced and after the passage of a train, the relays will not become energized.

In cases where track batteries are not renewed every six weeks, it is common to find that the solution is evaporated sufficiently to cause the zinc to be exposed. This is liable to increase the internal resistance of the cell and cause interruption; fluctuations of voltage will take place during a spell of wet track and the track relay will fail to operate. Sometimes such interruptions are erroneously classed as "leak in track section" or "escapes." To guard against this evaporation, a number of remedies have been suggested; principal among which are the application of crude or kerosene oil on top of the solution or the use of air-tight enclosures.

Track batteries should, of course, be kept dry; yet they have been known to work while completely flooded, being submerged for six days, delivering current uninterruptedly during that time and failing only when the supply of sulphate of copper became exhausted.

Batteries used for other than track purposes are usually kept in wells and houses. When placed in wells, a great difference is noticed as compared with those kept in chutes. In the latter the changes in temperature shorten their life. In the warmer months of summer there will be breaks, apparently due to expansion and contraction of the material of the jar. Sometimes the passage of trains will set up a vibration within a well which will disturb the cells and their contents and cause cracks.

To establish air circulation, thereby anticipating about 90 per cent. of the breaks in jars, a strip, shown in the illustration, has been designed, by which the cells are held above the shelf level, thus not only allowing the free circulation of air but preventing the accumulation of dirt under and around the bottom of the cell. This plan has been in use for several years and has accomplished its object beyond anticipation. The strips are straight, a pair supporting a row of jars. Strips are usually made in 4 ft. lengths. These strips also prevent cells from being thrown off the shelves by vibration, an accident which has been known to cause interruptions.

Glass jars are frequently shattered by repeated blows on the top edges by zincs which are caused to move up and down by the passage of trains. In a number of cells which were fitted with hard rubber cushions, placed between the zinc carrying wire and the top edge of the jar, this cause of damage was overcome. Extra heavy rubber tubing and tape were also partially successful.

Battery jars which have a lid or cover, such as the Edison Primary and the Nungesser, etc., often break, owing to the weight which is suspended from the lid. This is readily demonstrated by putting porcelain lids on glass jars; for glass jars tin lids seem to be the most successful.

In a certain territory comprising many thousand cells of battery of several prominent designs, half of the jars are glass and the other half porcelain, practically all being in wells. Records for a period of three years

*Articles by Mr. Balliet on the performance of automatic signals under unfavorable conditions were published in *The Railroad Gazette*, of Feb. 26, March 25, April 15, May 20, July 1 and July 8.

indicate that the breaks in glass, while in service, are about two to one of porcelain. The total number of breaks from all causes, in all types, is less than two hundred a year. The number of trains stopped at signals on account of these broken cells is very small when a rigid inspection is maintained. Few interruptions need occur with acid batteries, because it takes from one to six days for the solution to leak through an ordinary crack.

Records have been kept to show the comparative length of life of batteries using glass and porcelain; they indicate an increase of about 20 per cent. with glass over porcelain. This is apparently due to the ability of maintainers to run all cells nearer to complete exhaustion, owing to the fact that they can make a closer inspection.

There are very few cases where either glass or porcelain cells crack when kept in battery enclosures fixed on concrete foundations, or attached to posts which are set on concrete.

When porcelain jars are used, inspection is limited to taking readings with a low reading volt-meter. If the cell is of the acid type, the zinc and the other element may be raised through the oil film, but this is objectionable, for it is liable to break the wires, adding another cause of interruption.

Railroad Shop Tools.

(*Continued.*)

BORING MACHINES.

The accompanying illustration, Fig. 1, shows the 72 in. horizontal boring, drilling and milling machine made by the Detrick & Harvey Machine Company, Baltimore, Md. The machine consists of a horizontally revolving spindle, having a horizontal traverse parallel to the bed-plate and at right angles to the column runway. The spindle is mounted in a saddle having a vertical movement of 72 in. on the face of the column, and the column has a horizontal movement of 72 in. on the runway. Fast and slow power movements for the saddle and column, and power feeds and quick return for the spindle in either direction, are provided. Hand feeds are also provided for all motions. The runway is a box casting, ribbed and flanged. The top surface consists of a front and rear slideway, 14 in. and 8½ in. wide respectively. The width of the slideway over all is 56 in. and the depth under the slideway is 18 in. The column is a tapering box-shaped casting, with a base 71 in. wide x 81 in. long. At the rear and side of the column are the driving gearing and the motor for rotating the spindle and for feeding the column and the saddle. The spindle saddle is box section with a bearing on the vertical face of the column 56 in. long. The saddle is counterbalanced and has a 37-in. bearing for the spindle rotating sleeve. The bearings for the driving shafts and gears are cast on the saddle. The spindle is hammered steel, 5½ in., 6 in. or 6½ in. in diameter, with a No. 6 Morse taper hole in the end. The spindle is ground to a sliding fit in a sleeve 46 in. long. The sleeve is slightly tapered on the outside and revolves in the saddle on a bronze bushed bearing 37 in. long. Bronze and steel thrust washers are provided on the front and rear, and take-up collars are provided for wear. When motor driven, the rotating mechanism for the spindle consists of a 7½ h.p. reversible motor of the constant speed type, direct connected to the driving gearing and mounted on the base of the column. The work bed or bed plate is a flat box-shaped casting 12 in. deep, with T slots on its top surface. It is tongued and bolted to the runway. The dimensions of the bed plate are made to conform to the requirements of the customer. The outer support for the boring-bar consists of an upright post, carrying on its vertical face a vertically adjustable bearing for the end of the boring bar. This bearing is fitted with a stationary bushing, with a vertical bearing of 24 in. on the face of the post. The post slides horizontally, parallel to the main column on a supplementary bed resting on the bed plate. The adjustments in the outer support are made by screws hand operated. The boring and drilling feeds are eight in number. They are reversible and range from .007 to .4 per revolution of the spindle. The milling feeds to the saddle and column are also eight in number, ranging from .01 in. to .5 in. per revolution of the spindle. The speeds to the spindle are 20 in number, 10 through the sleeve gear and 10 through the face plate gear. The changes of speed are made by means of a cone of geers and by levers operating clutches. Four changes of speed are obtained by shifting of the levers and without changing the step of the cone. All power and hand movements, fast and slow, for the spindle, saddle and column are controlled by the operator from his platform attached to the saddle. Levers are conveniently placed within reach of the operator. The rapid movement of saddle and column is obtained by an independent reversible motor of 7½ h.p., mounted on a supplemental base at the rear end of the runway. The saddle has a 72-in. vertical movement and the spindle has a 72-in. adjustment. The column has 72-in. (or more if desired) horizontal traverse. The distance from the center of the spindle to the bed plate in its lowest position is 48 in., and in its highest position, 120 in.

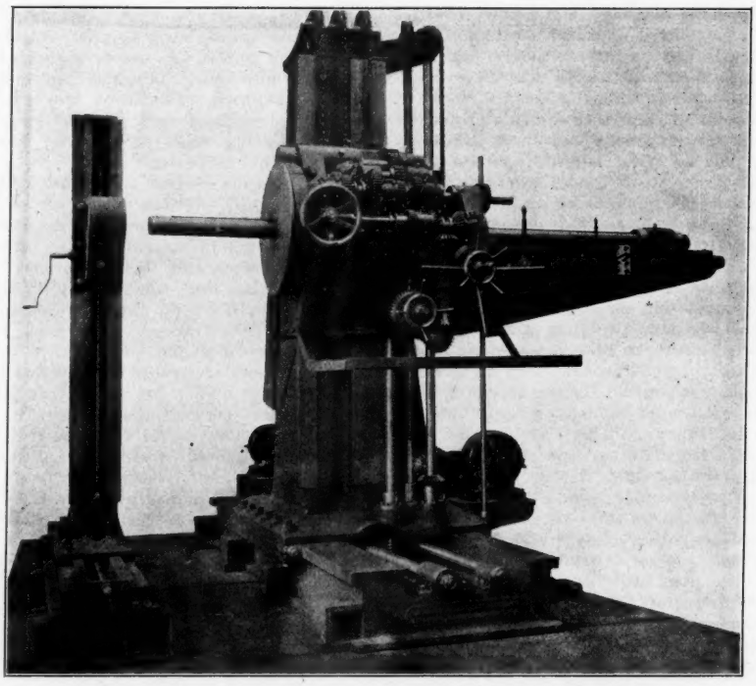


Fig. 1.—The Detrick & Harvey Horizontal Boring Machine.

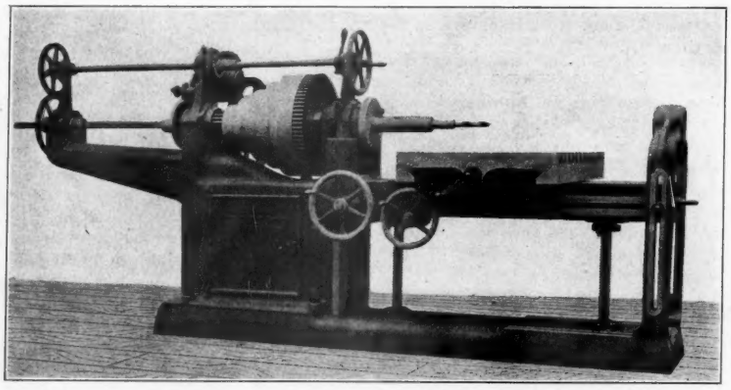


Fig. 2.—The Sellers Horizontal Boring Machine.

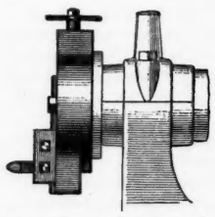


Fig. 3.—Sellers Facing Attachment.

The horizontal drilling and boring machine shown in Fig. 2 is made by Wm. Sellers & Company, Philadelphia, Pa. The spindle of this machine is 2⅞ in. in diameter and has an adjustment of 30 in. The feed is variable from the finest to over ½ in. per revolution of the spindle. The power feed is operated instantly by a positive clutch. The machine also has quick hand traverse and hand feed. The ratio of the back gear is 12 to 1 and the largest step on the cone is 20 in. in diameter for a 3-in.

belt. The table is 48 in. long by 28 in. wide and is slotted to receive bolts for holding the work. The table is adjustable both lengthwise and crosswise of the bed. The distance from the center of the spindle to the top of the table in its lowest position is 21 in. The pulley on the countershaft is 16 in. in diameter and has a 4-in. face and should run at 75 r.p.m. Fig. 3 shows a "revolving slide rest." This can be bolted to the flange on the end of the sleeve in which the spindle slides and is used for facing off large surfaces.

The double car box boring machine (Fig. 4,) is made by the Niles-Bement-Pond Company, New York. This machine will take boxes up to 6 in. x 12 in. It has two spindles. These are arranged so that four boxes can be bored and faced at the same time. The spindles are 2⅞ in. in diameter and are driven by gearing. The saddle has automatic feed and hand adjustment, and is provided with specially designed chucks for holding the boxes. One pair of boring mandrels 3 in. in diameter is furnished with each machine. The countershaft pulleys are 20 in. in diameter for a 4½-in. belt and should run at 350 r.p.m.

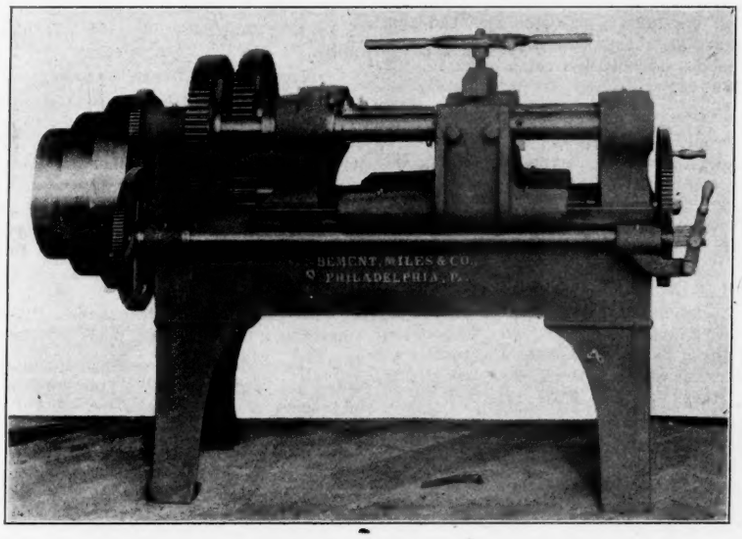


Fig. 4 —The Niles-Bement-Pond Car Box Boring Machine.

(To be Continued.)

A Panacea for One Class of Butting Collisions.

BY H. W. FORMAN.

The effect that displaying the order signal at "stop" at train order meeting points would have upon the collision record seems to have been brought out convincingly in the Train Accidents Report in the United States for May, published in the *Railroad Gazette* of July 1st.

If the statement were made that a pine tie would last as long in track as one of oak, no one would be justified in contradicting it unless he was in position to prove to the contrary. And so it is in the matter of surrounding train-order meeting points with additional safeguards, by also sending the order to the operator at the meeting or time-limit waiting point. No one should contend that it cannot be done successfully if he has never tried it. The only adverse argument that I have ever heard of is that three despatchers cannot handle the same number of trains on a district of the same length; that trains not interested may be unnecessarily delayed by order signals being at stop at so many stations, and that the extra expense for additional operators would be too great a burden. It has never been contended that it is not a good thing and that it has not and will not prevent many collisions. If there were more telegraph offices and fewer "blind sidings" despatchers would be able to move trains with less delay, and less overtime would be paid to the train and enginemen. Have those who have made the experiment found these objectionable conditions actually present to such a degree that trains could not make their trips satisfactorily? Has the outlay been found to be greater than the loss by the accident account and damage to reputation where such a plan was not followed? In speaking to any one who has not given the plan a fair trial, I may be allowed momentarily to disregard the objections advanced, for I shall deal only with the facts of a quarter of a century's experience with this method of moving trains on a very busy single track railroad.

The rule that all train orders shall be shown to brakemen and firemen is quite recent, having been adopted generally only a few years ago. No doubt it has been the means of saving many collisions, but even this precaution has not stopped them entirely, and it never will. The fact to-day is that in nearly every case of butting collision all the men on the train are found to have forgotten orders, or misread them. Orders will be forgotten hereafter with the same frequency, and it is useless to hope that this factor can ever be expunged from the collision record by discharging the men who forget. The new men put in their places are quite as likely to possess the same seemingly, and it never will. The fact to-day is that operator at the meeting point may also sometimes forget to display his signal should not dishearten any who are earnestly seeking relief from collisions; the remedy is not absolute but it is a real remedy. Collisions due to forgetting train orders will continue indefinitely under the present almost universal way of holding trains, and the easiest and most direct relief is to be found by including the operator at the meeting or waiting point in the movement, and requiring him to keep his train order signal displayed at stop and deliver a copy of the meeting or waiting order to all trains concerned, until all have arrived from one direction, or until the waiting time named in the order has expired.

Accidents due to complex breakage, fire and flood may be regarded as largely irremediable; those due to misplaced switches can be reduced by interlocking; but those brought about by aberration of the mind must be dealt with by the formation of habit, systematic checking and reminders in the form of cautionary or stop signals as the exigency demands.

Standard Code Rule 221A provides that train order signals shall normally indicate "stop," except when changed by the operator to "proceed" to allow a train to pass after getting orders, or for which there are no orders. Many operating officials are convinced that this is the true logical position for all signals. Rule 94 allows trains to change their relative positions at any siding without consulting the despatcher, and it is very doubtful whether, when one train passes another under such circumstances, without exchanging schedule or right, the crews always take the precaution to stop at the next open telegraph office and advise the operator and despatcher and wait for further instructions from the despatcher before proceeding. Therefore, it will be seen that Rule 221A leaves a great deal to the operator's intelligence and judgment, and that the only absolutely safe course for him to pursue under this rule is to stop every train while there are orders in effect at his station. The rule does not contemplate this being done. Operators do change their order signals to "proceed" to allow disinterested trains to pass, and there seem to be few if any accidents under the practice. If the normal position of the order signal is "proceed," as provided by Rule 221B, and it is displayed at "stop" on account of an operator being included in a meeting order, is there any greater danger, after conferring with the despatcher, in changing such signal to "proceed" for only a few seconds to allow some fast train which is not concerned to pass, provided that, in such cases, the interested superior train is invariably given a copy of the meeting order before it reaches the waiting point? If there is a particle of risk, and the despatcher often knows whether or not there is, all trains may be stopped for a clearance. It is in this manner that trains are handled on most roads which require all meeting or waiting orders to be addressed in duplicate to the operator at the place of meeting, and it is satisfactory. It is very desirable to use the semaphore form of train order signal when operating under this arrangement.

Any delay that trains may sustain stopping to get clearances is more than compensated for as the plan allows a more liberal use of the "19" form of train order. It permits such orders to be addressed to the superior as well as the inferior train. The "19" form may also be used to fix a meeting between extra trains, by first completing the order to the operator at the place of meeting and issuing the same instructions to the extras before they reach such station. Of course the order is worded to all alike, and, ordinarily, is sent to the three offices simultaneously. When a "19" order can be safely used for the superior train a delay of from five to twenty minutes is often avoided as it does not have to be stopped to get an acknowledgment of the order. It may be contended that, should the operator fail to deliver the order to the superior train, a collision would result; but the order signal being at stop at the meeting station prevents this. If the operator who is to deliver to the superior train were to overlook the order it is likely that he would at once inform the despatcher who could then if necessary take steps to prevent a collision.

I cannot recall many instances of failure

to deliver "19" orders; they are torn off and hung up in a conspicuous place as soon as completed and are not nearly so likely to be overlooked as "31" orders, which must be left in the book on the table where something may be allowed to cover them up. A collision has never been known to occur, through train and enginemen's forgetfulness, when the meeting order was sent to both trains where they would get them before reaching the meeting point, and also in duplicate to the operator at the place of meeting, except in cases of the grossest neglect, which cannot be fully guarded against under any system of orders.

What may be promised if these suggestions are thought enough of to secure the adoption of the plan? During the past twenty years from forty to ninety daily trains have been handled in this manner on several large roads in the United States having single track districts of 60, 85 and 115 miles in length, and it has been found that it could be done by the use of from 75 to 150 orders each 24 hours. The "31" form is seldom used by these despatchers, for it is not often necessary to stop trains to sign orders, except when meeting points are made at blind sidings. During this time there have been no collisions due to forgetfulness. This remarkable immunity results from the remoteness of the chance that the train and enginemen, and the operator, will all fail in their duty. Even if an operator were to incorrectly repeat an order (and those who have made a study of the collision record will find this to be of frequent occurrence) and the despatcher not detect the "lap," the order signal being at stop at the meeting point would prevent a collision. I cannot say just how many collisions have been prevented during my period of service under this rule, nor how many men have suddenly felt a choking sensation when an operator handed them an order reminding them of a meeting point which they had forgotten; but there must have been a good many, since the record shows that there were no collisions on that particular road, while others not operating under such rules were having them now and then. We did not have operators at every station, but meeting points were fixed at telegraph offices as much as possible, and every one admits that the percentage of risk is reduced in proportion to the number of available telegraph offices. It may be claimed that the proposition is impracticable for the reason that the operator at the selected meeting point often cannot be raised promptly. In such event, the order may state that the order signal is not at "stop" at the place of meeting, which is of itself a safeguard, because unusual.

Is there another officer with some such accident fresh in mind, or who has found it necessary to almost tie up his road by requiring acknowledgment from the superior train before permitting the inferior train to act on the order, now willing to join the ranks of those who have already thought best to adopt this scheme? The fact that there has never been an accident or error of this kind on your road, is hardly sufficient to warrant you in deciding that it is unnecessary to take this precaution, for no one can tell how soon some heretofore reliable employe may forget. Few escape. The spirit of the code rules is not violated in adopting this additional protection; a railroad may not do less than the rules prescribe, but it surely has the right to adopt additional safety practices if deemed expedient.

For years the Burlington road has been operated under the following rules:

"208.—A train order to be sent to two or more offices must be transmitted simultaneously to as many of them as practicable. The several addresses must be first to the operator at whose station the trains are to meet, and next in the order of superiority of trains, each office taking its proper address. When not sent simultaneously to all, the order must be sent first to the superior train."

"221 (C). Orders addressed to operators, restricting movement of trains, will be respected by conductors and enginemen the same as if addressed to them. Operators, in such cases, will deliver copies of the order to all trains affected until all have arrived from one direction, when, if there are no other orders in effect at that station, the train order signal will be changed to "proceed."

Master Mechanics' and Master Car Builders' Committees, 1905.

Mr. J. W. Taylor, The Rookery, Chicago, Secretary of these two associations, announces the subjects and committees for the year 1904-05.

MASTER MECHANICS' ASSOCIATION.

1. *Proper Loading for Locomotives.*—What should be the practice underlying the proper loading of locomotives on the basis of conducting transportation with the greatest efficiency and at the least cost, considering all the factors individually? C. H. Hogan, Chairman; H. T. Herr, D. F. Crawford, H. T. Bentley.

2. *Locomotive Tests of Pennsylvania Railroad Company at St. Louis Exposition.*—To report to the convention the results obtained from tests made. F. H. Clark, Chairman; H. H. Vaughan, F. M. Whyte.

3. *Locomotive Front-Ends.*—(a) To carry to completion the tests outlined in its report to the convention of 1903. (b) To investigate the question of design and material for locomotive fronts and front doors with the view of affording relief from leaky front-ends. H. H. Vaughan, Chairman; F. H. Clark, A. W. Gibbs, Robt. Quayle, Prof. W. F. M. Goss.

4. *Locomotive Driving and Truck Axles and Locomotive Forgings.*—To submit specifications after they have been considered by the International Railway Congress to be held at Washington in May, 1905. F. H. Clark, Chairman; S. M. Vauclain, L. R. Pomeroy, J. E. Sague, E. B. Thompson, F. W. Lane.

5. *Shrinkage Allowance for Tires.*—To consider whether the present shrinkage allowance—$^1/_{80}$ in. per foot—is sufficient for the large diameter wheels with cast-steel centers. F. J. Cole, Chairman; J. E. Muhlfeld, A. S. Vogt, W. A. Nettleton.

6. *Motive Power Terminals.*—What can and should be done to reduce locomotive terminals to the basis of a machine for treating and handling engines, apart from the question of housing, the object being the prompt handling of power, greater efficiency in service and less detention at terminals, while affording more time and better facilities for care and repair of engines? To investigate the best method of heating and ventilating roundhouses. D. R. MacBain, Chairman; G. W. Wildin, P. Maher, C. R. Chambers, W. R. McKeen, Jr.

7. *Flexible Staybolts.*—To consider the subject of flexible staybolts, number in use, manner of applying and service rendered. R. N. Durborow, Chairman; F. M. Whyte, C. E. Fuller, O. H. Reynolds.

8. *Water Softening for Locomotive Use.*—The practicability of water softening for locomotive use by means of chemicals or the application of heat, and the maximum cost per one thousand gallons permissible that the expenditure could be recovered in reduced motive power expenses. J. A. Carney, Chairman; L. H. Turner, J. F. Dunn, F. N. Risteen, Robt. Quayle.

9. *Service of Locomotives.*—To consider the average engine hours locomotives are in service, in shop under repairs or waiting to get in shop, per annum, and the percentage of total time locomotives are actually in and out of service per annum. Wm. Forsyth, Chairman; H. Bartlett, D. Van Alstine, J. S. Chambers.

10. *Shop Layouts.*—To consider the question of shop layouts for roads having 350, 500, 750 and 1,000 locomotives. R. H. Soule, Chairman; R. P. C. Sanderson, C. A. Seley, H. D. Taylor.

11. *Subjects.*—To suggest subjects for committee work and individual papers during the year 1905-06; also subjects for topical discussions at the convention of 1905. J. F. Deems, Chairman; Wm. McIntosh, R. D. Smith.

MASTER CAR BUILDERS' ASSOCIATION.

1. *Arch Bars.*—To prepare a design for arch bar for 100,000-lbs. capacity cars. J. E. Muhlfeld, Chairman; A. S. Vogt, C. E. Fuller, W. T. Gorrell, F. M. Gilbert.

2. *Safety Appliances.*—(a) To confer with the Interstate Commerce Commission in regard to the standards of the Association; (b) to prepare and submit to the convention of 1905 a design showing: (1) Ladder; (2) Location of ladder; (3) Location of handholds on roofs. D. F. Crawford, Chairman; H. D. Taylor, A. E. Mitchell.

3. *Tank Cars.*—To continue its investigations and report result of tests as outlined in report of proceedings for 1904. A. W. Gibbs, Chairman; C. M. Bloxham, R. Gunn.

4. *Steam Connections.*—To continue experiments and submit detailed dimensions for steam heat hose coupling. H. F. Ball, Chairman; T. W. Demarest, F. H. Clark.

5. *Passenger Car Rules.*—To consider and report whether a revision of the present passenger code of rules is advisable. J. T. Chamberlain, Chairman; G. W. Wildin, F. W. Chaffee, F. N. Hibbits, R. W. Burnett.

6. *Repairs of Steel Cars.*—To design a more effective form of fastening the center sills when cut off near the bolster, and such other questions as were referred to it by the convention. T. H. Russum, Chairman; R. F. McKenna, I. N. Kalbaugh, E. B. Gilbert, G. N. Dow.

7. *Air-Brake Hose.*—To follow up tests suggested in report at 1904 convention, under both present and proposed specifications, and report results. Le Grand Parish, Chairman; T. S. Lloyd, J. Milliken, F. H. Scheffer, G. H. Emerson.

8. *Coupling Chains.*—(a) To revise present design for permanent safety chains for wooden cars. (b) To submit design of chain for chaining cars together when hauling twin and triple shipments. R. P. C. Sanderson, Chairman; R. L. Kleine, Jas. Macbeth, R. B. Rasbridge, J. F. Walsh.

9. *Stenciling Cars.*—To submit a design for stenciling cars. H. M. Carson, Chairman; J. S. Lentz, W. F. Bentley, Geo. T. Anderson, Jos. Buker.

10. *Doors.*—(a) To revise the drawing of the outside sliding door shown on M. C. B. Sheet F, and recommend a design for a flush door. (b) To consider the question of a suitable grain door to meet requirements of the present large capacity cars. J. E. Keegan, Chairman; W. E. Sharp, T. A. Treleaven, J. W. Muncy, D. Van Alstine.

11. *Subjects.*—J. S. Chambers, Chairman; F. T. Hyndman, O. M. Stimson.

M. C. B. STANDING COMMITTEES.

Arbitration.—F. H. Clark, P. H. Peck, T. W. Demarest, J. J. Hennessey, E. D. Bronner.

Supervision of Standards and Recommended Practice.—C. A. Schroyer, Chairman; M. Dunn, T. S. Lloyd.

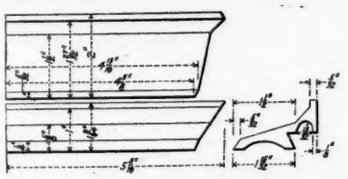
Triple Valve Tests.—Wm. McIntosh, Chairman; F. H. Scheffer, C. A. Schroyer, W. S. Morris, A. J. Cota.

Brake-Shoe Tests.—Chas. Coller, Chairman; Wm. Garstang, Prof. W. F. M. Goss.

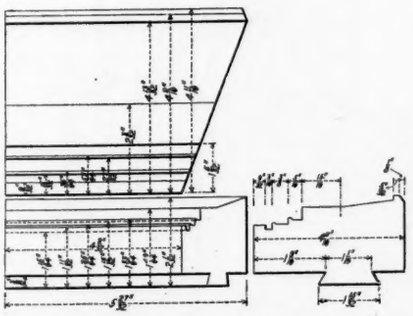
Tests of M. C. B. Couplers.—R. N. Durborow, Chairman; W. P. Appleyard, W. S. Morris, Jos. Buker, F. H. Clark.

Draft Gear.—E. D. Bronner, H. D. Taylor, W. F. Kiesel, Jr., G. W. Smith, Mord Roberts, Le Grand Parish.

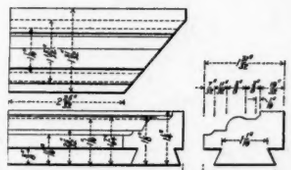
Revision of Rules for Loading Long Material.—A. Kearney, Chairman; W. E. Fowler, J. W. Luttrell, A. Stewart, F. H. Clark, T. H. Curtis, W. F. Kiesel, Jr.



Undercut Tool for 4¼-in. U. S. Packing.



Undercut Tool for No. 10 Simplex Injector Steam Nozzle.

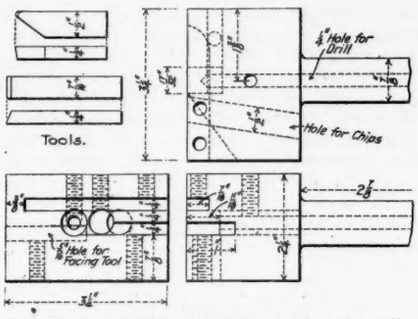


Undercut Tool for ¾-in. Globe Valve.

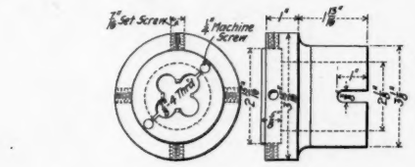
The Oriental Railroad Company, which works the railroads in European Turkey, had sufficient excitement last year. Uprisings, actual or threatened, in Macedonia and elsewhere, were accompanied by numerous explosions of dynamite at bridges and other structures, and dynamite cartridges and infernal machines interrupted the regular operation of trains, wounding not only several soldiers, but killing the cook and injuring several passengers on the Oriental express. The army of soldiers which the government sent to protect the railroad was itself a considerable hindrance to its operation. The Turkish soldiers were very suspicious of the trackmen and other employees, who are largely Bulgarians. Moreover, the transportation of the soldiers was destructive of all regularity in train service, orders being given and countermanded in a heart-breaking way. Notwithstanding all this, the railroad earned 15 per cent. more than in 1902 (which had its own troubles), and the stockholders got 5 per cent. dividends.

Box and Undercut Tools in the Santa Fe Shops.

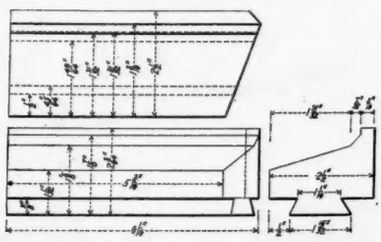
In the article "Notes from the Topeka Shops of the Santa Fe," published in our issue of June 3, reference was made to the special forms of box and undercut tools in use in the brass department, which have greatly cheapened the cost of producing different parts by largely reducing the number of operations. The full set of record drawings of these tools has been completed only lately, and a set of blue prints from these drawings has been set us by Mr. A. Lovell, Assistant Superintendent of Motive Power. A number of representative tools have been chosen from this lot for illustration herewith.



Box Tool for 8-in. Air Pump Valve (Steel).



Die for Injector Throttle Stem.



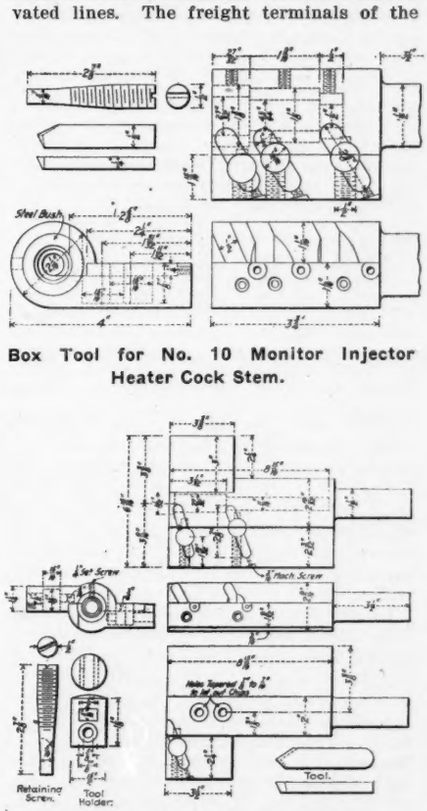
Undercut Tool for 2¾-in. U. S. Packing.

The New Haven's Electrification Plans in the Bronx.

President C. S. Mellen, of the New York, New Haven & Hartford, has announced that that company is about to spend eight million dollars in electrifying the Harlem River & Port Chester line through the Borough of the Bronx, New York City, and Westchester County, from the Harlem river to New Rochelle. Plans and estimates have been made for a six-track road, two tracks to be used for steam trains and four tracks for electric trains. Two of these latter will be used for express service and two for local trains and the present local passenger service by steam trains will be discontinued.

The main line of the New York, New Haven & Hartford is four-tracked down to Mount Vernon, and from there to Woodlawn, where it runs into the Harlem division of the New York Central, there are at present but two tracks. The New Haven's suburban business is drawn almost entirely from the towns situated between Mount Vernon and Greenwich, Conn., and all of the suburban trains are run through Mount Vernon and Woodlawn, from which point they run express over the Harlem division of the New York Central to the Grand Central Station. The region lying between the Sound and the main line is served by the Harlem River & Port Chester line, a double-track road which branches off from the main line at New Rochelle and ends at the 129th street station of the Second and Third avenue elevated lines. The freight terminals of the New Haven road in New York City are located along the Harlem river and connect with this branch line and all freight trains as well as the through passenger trains between Boston and Washington, which are ferried around Manhattan Island, are run over it to New Rochelle on the main line. It is therefore essential, for the present at least, to maintain two tracks for steam trains.

Box Tool for No. 10 Monitor Injector Heater Cock Stem.



Box Tool for Injector Throttle Stem.

The improvements, which practically amount to entirely new construction, will begin at the east end of the Harlem river yard and will extend all the way to New Rochelle, a distance of a little more than 12 miles. The right-of-way of the present line will be followed except in a few places where a slight divergence will improvve the alinement. All grade crossings will be eliminated without any radical changes in the established street levels, the grade of the new line being adjusted to meet the contour of the surroundinng country. Many of the streets are laid out on paper only but the necessary abutments for bridges will be put in at the

time of building in the event of these streets ever being opened, so that no expense or delay will be incurred after the line is once in operation. There are in all 31 under passes and 25 overhead bridge crossings provided for. The maximum grade has been fixed at .6 per cent., and the maximum curvature at 5 deg., so that the new line will be suited for high speeds. East Chester Bay is to be crossed on a pile and timber trestle 1,600 ft. long with an 80-ft. rolling lift bridge over the channel. With the exception of a short swing bridge over Westchester creek this is the only obstruction to high speed.

The four tracks for electric trains are to be on the north side of the right-of-way, and the station buildings wherever possible will be placed on that side. At some of the stations, however, where the street approaches are from the south, the buildings will be placed on that side and the platforms will be connected with subways under the tracks. The construction will be chiefly third-class masonry retaining walls in the cuts and fills with solid-floor steel bridges over all the highways. The engineer's estimate of the cost of construction of the new line, exclusive of the electrical equipment, is $4,825,900. Mr. B. F. Simmons, Assistant Chief Engineer of the Electric Department, estimates the cost of the electrical equipment to be $2,876,000, distributed as follows:

Seventy cars equipped with electricity, complete	$750,000
Four third-rails with top protections and bonding surface rails with necessary marine cable at drawbridges	415,000
Feed wire, high-tension wires and pole line, complete	336,000
Two sub-stations (with electrical apparatus)	280,000
Power house, with all material	920,000
Car barn	100,000
Sundries	75,000
Total	$2,876,000

The cars which will be used are to be very similar to those in use by the Interborough, and most of the details of the third-rail and transmission lines will be in accordance with the company's standard practice on its other lines through Connecticut and Massachusetts, which are now operated by electricity.

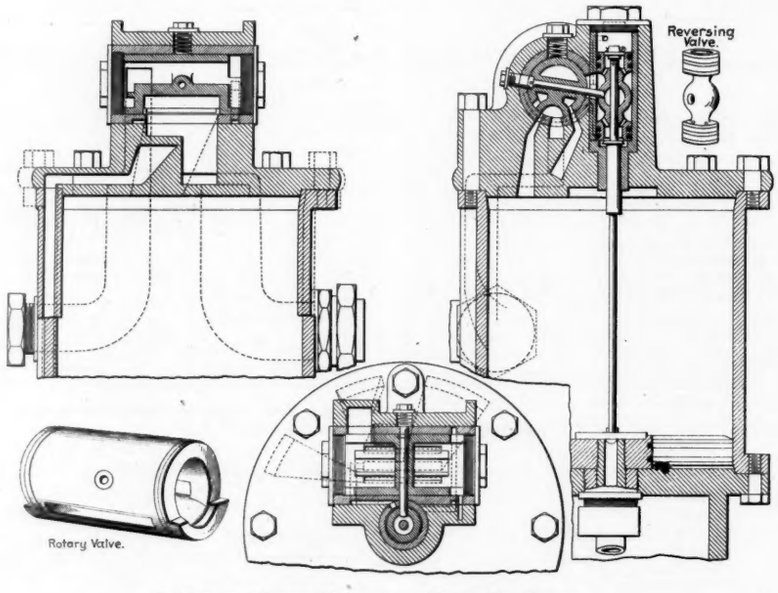
In addition to this proposed change, the New Haven road is considering building a branch line from West Farms on the Harlem River & Port Chester, north along the Bronx river to Woodlawn, the western terminus of the main line, a distance of about 3½ miles. This would serve Woodlawn, Mount Vernon and Pelham and give these towns both the main line steam service and the electric service. The Interborough subway line will probably be ultimately extended up through the Bronx to West Farms, so that there is the possibility of through electric train service from New Rochelle to City Hall and the Battery.

The funds for these improvements will be furnished by an issue of $15,000,000 in bonds which has been authorized by the directors of the railroad company. The surplus from the sale of these bonds over the cost of constructing and equipping the new line will be used to repay the money advanced from time to time by the New Haven road to the Harlem River & Port Chester, which road is held under a 99 year lease. The current press statement that the New Haven road has never had any funded debt is, of course, incorrect. The general balance sheet of June 30, 1903, shows $4,364,000 of bonds outstanding, secured by mortgage.

The work is to be begun as soon as the formal approval of the city and State authorities is obtained, and the line will probably be ready for operation in a year and a half. It is the intention to run both local and express trains between the Harlem river and New Rochelle at 15 minute intervals.

A Rotary Steam Valve for Air-Brake Pumps.

A rotary valve for steam engines has been patented by Messrs. John C. Lyons and Daniel H. Brown, of McComb, Miss. The accompanying engravings show the valve applied to a 9½-in. air pump, the change required in the regular pump being the application of a new head. The perspective view of the valve shows it to be a cylindrical shell with two ports in the lower half, a lip on the lower side of each end and packing rings near each end. At the bottom between the steam ports the valve is recessed, as shown in the sectional views. The valve bushing has an opening on top for the steam supply similar to the Westinghouse pump except that it is near the end, outside of the valve packing ring. The bushing has a cap screwed into each end. Steam enters the interior of the valve and is admitted to, and exhausted from, the cylinder by the oscillation of the valve. This oscillation is accomplished by means of a pin passing through the center of the valve, one end of which engages a recess in the reversing valve.



A Rotary Steam Valve for Air-Brake Pumps.

The reversing valve, a perspective view of which is shown, is the piston type with a spherical central part. It is drilled lengthwise for the reversing rod and is also counterbored at each end. Mounted on the reversing rod at each end of the reversing valve is a valve which seats on the outer edge, and forms a closed chamber, of the counterbored recess. The distance between these two valves is slightly greater than the distance between their seats, so that when one chamber is closed the other is open, and in communication with the exhaust. Small holes lead from these chambers to the space around the central part of the reversing valve. This space is also in communication with the main exhaust through a port on the outside of the rotary valve bushing.

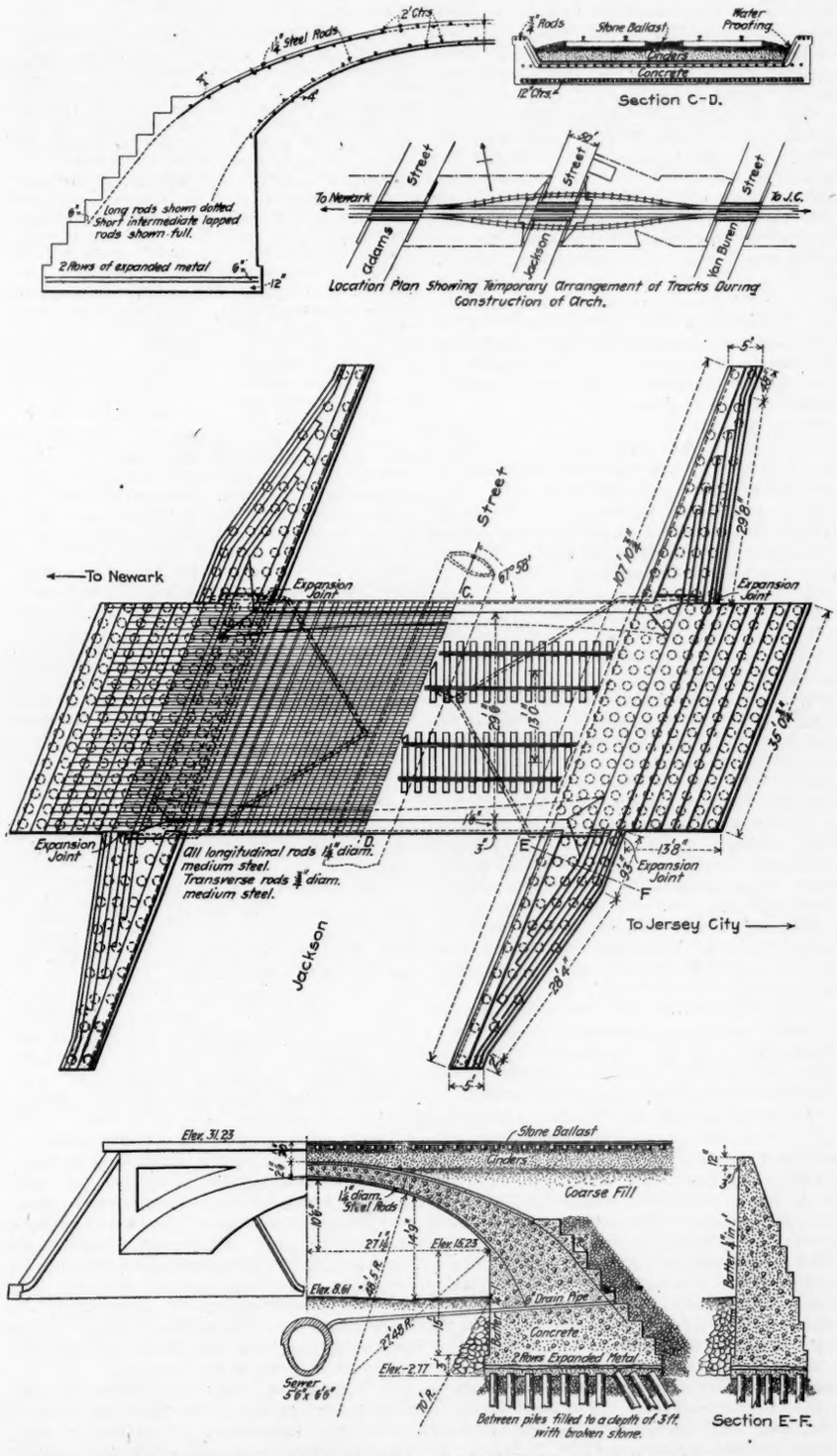
The drawings show the piston at the lower end of its stroke and the rotary valve in position to admit steam to the lower side of the piston. One lip on the rotary has closed a small port leading to the bottom of the reversing valve, while a companion port at the opposite end of the rotary is open to admit steam to the top of the reversing valve, holding it and the rod in the lower position. When the piston nears the upper end of its stroke it strikes the shoulder on the reversing rod, unseating the top valve and permitting the steam above the reversing valve to escape through the latter to the exhaust. As the piston continues its movement the reversing valve is also carried upward, moving the rotary valve by means of the pin. The lip on the opposite end has meanwhile cut off the steam from the top of the reversing valve, and steam has been admitted to the lower side of the reversing valve, holding the latter and the rod in their upper position until the piston in its downward stroke again causes reversal.

Should the rotary by chance stop on center, both steam ports would be closed, but the auxiliary ports to the ends of the reversing valve would both be open. The weight of the reversing rod would cause it to seat on top of the valve and upon steam being admitted to the main valve, its entrance above the reversing valve would force the latter downward, moving the rotary and closing the port leading to the lower side of the reversing valve. Leakage past the packing rings of the reversing valve would have no effect beyond wasting steam to the exhaust.

A Double Track Concrete Steel Arch.

The 54-ft. concrete steel arch shown in the accompanying illustration was built to replace a 3-span plate girder composite wood and iron bridge over Jackson street, Newark, N. J., on the line of the Newark & New York branch of the Central Railroad of New Jersey. The arch is 32 ft. wide over the copings and is designed for an E-50 loading. The piers are built on a pile foundation. The piles are of yellow pine 10 in. in diameter at their smallest end, stripped of all bark and driven to a firm foundation. They are spaced 2 ft. 6¾ in. center to center. The three back rows of piles are batter piles and are driven in a line with the thrust of the arch. Portland cement was used throughout and the concrete was mixed in the following proportions for the different parts of the arch; for the arch ring from springing line to springing line, 1:2:4 concrete; for the abutments, 1:3:6 concrete; and for the wing and parapet walls a 1:3:5

mixture was used. The cement mortar was composed of one part cement and three parts of sand. The specifications required that the stone used in the arch ring must not exceed 1½ in. in any direction. The longitudinal reinforcing bars are 1¼ in. in diameter and are placed in the arch about 4 in. from the surface and are carried well down into the haunches of the arch. The transverse rods are ¾ in. in diameter and are spaced 2 ft. between centers. They are interwoven with the longitudinal rods. The concrete was laid quite wet around these rods so as to procure a good bond with them. Two rows of expanded metal reinforcement was laid in the abutments close to the top of the piles. The exterior of the arch is finished with a waterproofing consisting of three coats of Cerion paint and over this is laid a ½ in. layer of pure asphalt. A covering of clean sharp sand and fine gravel was spread over the heated asphalt before the filling was put in place. The drain from the fill over the haunches of the arch is led off through drain pipes which project through the wing walls and connect with the main street sewer as shown. While the erection of the arch was in progress, the tracks were conveyed over Jackson street on a temporary trestle placed on each side of the arch, as shown in the plan. Thus the work was carried on without interfering with traffic. The contractors for this work were Holmes & Cogan, Jersey City, N. J. Joseph O. Osgood, Chief Engineer of the railroad, designed the arch, and we are indebted to him for the drawings.



A Double Track Concrete Steel Arch, Central Railroad of New Jersey.

Analysis of Passenger Train Earnings.

The fundamental idea of all railroad statistical groupings is to place cause against effect or in the case of business, expenses against earnings and absolutely identify one against the other. Because the effects are mixed in with a great many other effects in other places, it is exceedingly difficult to do this, especially in connection with passenger service which includes many elements of advertising and in many ways tends to serve the freight department. But it is always desirable to know the amount of money we are spending for advertising, whether it be to the newspapers or whether it be a loss in running a passenger train, and carry it either in our statistics or in our thought against the revenue which it is a cause of producing.

The indirect effect of train service, perhaps, may fall under two heads:

(1) The general advertisement for carrying competitive business.

(2) The passenger service necessary to support and exploit a territory for account of the freight business which it will offer.

Remember that our business is to identify outgo against the intake which enjoys the benefit of it and that the only reason for outgo is the intake or the prospect of intake and the fundamental classification is into the groupings on the revenue side; therefore we want to break our revenue into these groups of demand which are more or less separable and independent from one another. In the case of a freight ton mile one freight ton mile is the same as another in the service of a particular point provided they are no more than 24 or 36 hours apart, let us say; but in case of a passenger train mile the service must have a schedule and we deal not only with the passenger train mile itself, but with the modified condition of the frequency of the service rendered. The other feature of demand which the passenger train serves is the movement from place to place; that is, a passenger train mile on one division is of no use for meeting the demands for a passenger train mile on another division. In a general way, we may say that a passenger train mile made one way requires an equal passenger train mile in return, although there may not be passenger miles in that direction to fill the train. A passenger train mile in addition to being a service between specific points on any one division and at a certain rate of frequency per day is modified by a further consideration that it must have relation to connections reaching to destinations off the given division.

The passenger train mile in addition to meeting the demands of passenger transportation supplies the demand for mail, express and milk transportation in various combinations. Still keeping in mind that the principle of our classification is to offset intake with its expense, we either should assemble all of the earnings against the passenger train mile expense that produced them or arrive at some basis of apportioning the passenger train mile expense under the classes of earnings which it serves. The latter proposition is most intricate and the principle upon which it could be done is so far unknown.

If the foregoing reasoning is correct in the application of these principles, the following rules would provide for a natural classification of passenger train earnings that would give the traffic man and the operating man logical totals with which to deal.

(1) Determine from the general knowledge of all traffic what are conceived to be general groupings that will fairly describe

the frequency and quality of service rendered, to cover all the varieties from the most elaborate to the crudest of the branch lines. One of these would be the minimum local service, another one would be the minimum local service with the minimum through service, possibly another one might be the special service run for a special connection or a shopping train to a particular town. So the traffic man as he knows the general field of demand would break it up into a few logical groups that were detachable one from another.

(2) Group all minimum service trains, regardless of direction or division, together and set against them their entire earnings.

Inasmuch as a train mile may be a differing thing according to speed and class of cars and number of cars in trains it would be best to substitute for the train mile an arbitrary estimate of the expense per mile, computed for each of the various runs. In doing this we would simply carry out the idea of the train mile, which if we look at it closely, is merely an index to expenses and if we find that it is inaccurate as an index we substitute the expense itself by an arbitrary estimate which is a little more accurate.

(3) Through service regardless of direction shown by divisions.

(4) Special services.

Passenger train earnings analyzed by the above groupings, would enable the traffic man to know where he was spending the money and where he was getting it back. It would further enable him to locate those places where he was spending money where he would have to look into some other department for the earnings and the amount of such money that he would expect such other departments to produce to offset this expense in the earnings. The whole field could then be kept in mind, not by indefinite impressions but by close analysis of the factors which controlled it.—*Wall Street Journal.*

New Train Rules on the Delaware & Hudson

General Superintendent A. J. Stone, of the Delaware & Hudson Company, has issued a new Book of Rules for the operating department, and it went into effect on August 1. That portion of it which corresponds to the Standard Code of the American Railway Association appears to have been made up with exceptional discretion; and it goes without saying that the work has been done with minute care. As evidence that the world is moving it may be noted that two words which are found probably in every other rule book in America are here conspicuous by their absence—"brakeman" and "operator." In the place of brakeman and flagman the word trainman is used, and where the reader expects to find "operator" he finds "telegrapher."

The rules of the D. & H. were revised only five years ago and were then made to conform in most respects to the Standard Code, but the present issue is a marked improvement over that one, a noticeable change being the adoption of numbers for the rules which correspond to the Standard; in the former code the numbers did not correspond.

The "form of order putting rules in effect" is printed on the title page. Next comes an index, with the topics arranged alphabetically, in place of the more common "list of contents" arranged in the order of pages. The general rules A, B, C, etc., number 26, as compared with 12 in the Standard, and this chapter is greatly amplified from the former D. & H. code. The subjects of some of these rules are:

M: Employees must pay their debts; N: Assignment of wages forbidden; Q: Economy, order and cleanliness, etc.; S: Minors must not be employed in train, yard or engine service without the written consent of parents or guardians; U: No person whose sense of hearing, sight or color perception is defective will be employed in any branch of the service where signals are used; V: Caution against taking care in coupling cars; W: Similar caution as to machinery and tools, etc.; Y: Pay rolls.

Among the definitions are one of "meeting point" and one of passing point. A passing point is a place shown on the timetable where trains moving in the same direction pass, by schedule or by train orders. (The question which train passes the other is left for the reader to figure out.)

Rule 2 requires the watch certificate to be renewed and filed with the superintendent Feb. 1 and Aug. 1. Rule 3 is followed by 3a and 3b, which are rules for station clocks not standard; and 3c, which requires conductors before leaving terminals to compare time with enginemen and trainmen, and requires enginemen to compare with firemen. For Rule 4 the D. & H. takes the second form given in the Standard. Rule 5a says: Meeting or passing points at the ends of double track, at junctions, and at terminal stations will be shown in schedules when the difference in the times of trains is five minutes or less.

Rule 10b shows green for proceed, the same as the former D. & H. code; but Rule 10c prescribes yellow where the old code had red and green.

Rule 17a reads: When there are more trains at a meeting point than the siding will hold, the head-light of the leading engine must not be concealed.

Rule 26 formerly prescribed a red and blue flag, but now it conforms to the Standard, requiring blue only. Rule 33a prescribes the use of white signals for keeping people off the track at crossings. Rule 33c prescribes a yellow flag or light as a slow sign, where the track is not perfect; it indicates a speed of six miles an hour unless another rate has been announced by bulletin. Rule 88a authorizes an extra moving in the superior direction to hold the main track; 88b applies Rule 99 to cases where a train backs out or pulls out; and Rule 88c requires a train crossing to the other track to apply Rule 99 in both directions on that track.

Rule 90a reads: When trains meet by special order, or time-table regulations, conductors and enginemen must inform each other what train they are.

Rule 90b requires the conductor to give a stop signal on approaching a meeting point, the same to be given immediately after the station whistle is sounded. On passenger trains signal 16d will be used.

The time interval in Rule 91 is five minutes. Rule 93 is amplified considerably. It provides, among other things, that on double track a regular train may pass and run ahead of a train of the same class or its sections; an extra may pass and run ahead of another extra or a second-class train, etc. Rule 104a reads: "Any employee intending to open or close a switch after a train has passed over it, must stand on the opposite side of the track from the switch-stand until the train has passed."

Rule 211a forbids the use of a "19" order to move opposing trains; rule 211b requires conductors to show train orders to their trainmen, and requires enginemen to show them to their firemen.

The train order forms given are A, B, C, D, E, F, G; H for single track and H for double track; J, K, L, M, P, R and S. Thus ends the standard portion of the code.

The rules describing the duties of the principal classes of employees begin with No. 500 and fill 90 pages. They are somewhat fuller and more detailed than the similar rules of the Pennsylvania, but still are rather brief. Electric self-winding synchronizing clocks are the only kind designated as standard clocks. Enginemen must take the utmost pains to sound the whistle signals accurately, and must report to the superintendent any improper rendering of hand or lamp signals by other employees.

Among the rules for station agents are the following:

565. They are in charge of the company's interests at their respective stations, of its buildings, sidings and grounds within the station limits, of the station appliances and equipment, of its accounts and records, of the material and supplies furnished for its work, of all cars at the station except in trains, of the receipt, care, forwarding and delivery of baggage and freight, of the sale of tickets, collection of the station revenues, remittance or deposit of money received for the company, of such disbursements thereof as may be properly authorized, of all station employees, and other employees while at the station, so far as relates to their conduct or to the station work. They will also have charge of such other matters as may arise in connection with the station management or may be assigned to them by proper authority. The company's business affairs must not be divulged except to the proper officers of the company.

569. They must familiarize themselves with the boundaries of the company's property at their stations, and not permit any encroachment thereof. Unless provided for by lease, they must not allow any commodities to be placed on grounds of right of way at their stations for the purpose of storage without written permission from the Superintendent, and then only after release on prescribed form has been executed by the owner.

570. Agents must acquaint themselves with the business and interests of people among whom they are situated, use all proper means to secure traffic, and act with a view of accommodating the public and promoting the best interests of the company, notifying the proper officers of anything affecting the departments, detrimental thereto, or conducive to its good, present or future.

571. They must prescribe proper hours of duty for their subordinates, and see that the time so defined is faithfully devoted to the business of the company.

Train employees must contribute "as far as they can without being unduly officious," to the convenience and comfort of passengers, particularly women and children, the infirm, inexperienced, etc. They must see that the ventilation of cars receives "intelligent" attention. Passenger trainmen, when not performing other duties, must station themselves at the end of the car where the air-brake attachment is located, so as to be able to apply the brakes in case of emergency. A trainman must never flag a train at night with a red and a white light in the same hand. In the daytime they must spread the flag so that it can be seen, and should wave it so that the engineman may be able to distinguish it from other objects of the same color. A frequent injunction in the rules for freight conductors, as well as for other classes of employees, is to "notify the superintendent by telegraph." If these rules are faithfully carried out in each case the D. & H. wires will be kept pretty "hot" most of the time.

Following the rules for classes of employees are extracts from the postal regulations prescribing what is to be done in dealing with mail bags and explaining under what circumstances a post office inspector has authority to interfere with the handling of the mails.

Special order books and bulletin boards are maintained at all principal points, and the rules prescribe how these are to be used. Four pages are given up to lists of tools required on engines, cabooses, etc.; and there are three rules on the care of lamps.

GENERAL NEWS SECTION

THE SCRAP HEAP.

At St. Louis, August 22, 14 ticket brokers were arrested for dealing in non-transferable tickets.

Press despatches from Pittsburg announce that the reduction of one-third in the rates on iron and steel products for export, which was granted by the railroads at the beginning of this year for a period of eight months, has been extended to Jan. 1, 1905.

The Illinois Railroad Commission has called meetings for September 6 in Springfield and September 8 in Chicago, at which about one hundred railroads and street railroads will be called upon to show cause why they should not equip certain grade crossings with interlocking signals.

A western paper says that the porters of the Pullman Company claim that they are not receiving as much money in tips as formerly, and they talk of agitating for more pay. One porter, who has been discharged, is the author of a book entitled "Freemen, yet Slaves, under Abe Lincoln's Son."

The Delaware, Lackawanna & Western has taken action similar to that taken by the Pennsylvania recently, dismissing one brakeman from each through freight train crew. It is said that the Erie contemplates a similar move. The Lackawanna now has 74 per cent. of its own freight cars equipped with air-brakes. Reduction of freight train crews was last week ordered on certain divisions of the Pennsylvania which were not included in the order issued in July.

It appears that the virtual consolidation of the Cincinnati, Hamilton & Dayton and the Pere Marquette has already broken up the long standing arrangement between the C., H. & D. and the Michigan Central for through traffic between Cincinnati and Detroit; and the Michigan Central announces that fast trains will be run through between Detroit and Cincinnati by a new route. It will be by way of the Hocking Valley and the Cleveland, Cincinnati, Chicago & St. Louis. These trains will run over the Hocking Valley between Toledo and Carey, 50 miles. The distance through is about eight miles longer than over the C., H. & D.

Local papers in Pennsylvania have been reporting that the Pennsylvania Railroad intended to modify or abrogate its rule forbidding the presence of newsboys on trains except in terminal stations before departure; but an officer of the road tells us that there is no intention of making any change. The rules governing the conduct of news agents have been re-issued, but they contain no radical change, and all trains on the main line will continue to be free from the newsboy nuisance throughout their trips. On the branches, news agents are allowed on some trains because they are a real public benefit, supplying papers and magazines to people in towns where a news stand could not be made profitable.

Steel for Chicago Elevated.

A contract for the structural steel for the Chicago South Side Elevated Railroad extension, about 21,000 tons, has been given to the American Bridge Co. The value of the contract is about $1,575,000, and the time allowed for delivery is about 15 months. Before the work is completed, an additional 11,000 tons may be contracted for. The Illinois Steel Co., another branch of the United States Steel Corporation, will probably receive the contract for the rails to be used on this railroad.

Heavy Freight Haul.

Press reports say that on Aug. 19, one of the heavy consolidation (2-8-0) type locomotives of the Lake Shore hauled a train weighing 5,800 tons between Youngstown and Ashtabula, a distance of 63 miles, in four hours. The load consisted of coal and the cars were principally of 80,000 lbs. capacity.

Launch of a Big Turbine Steamer.

The Allan Line steamer Victorian, the largest turbine vessel yet built, was launched at Belfast, Ireland, August 25, and, it is expected, will be in service before the end of the year. She is 540 ft. long, with 60-ft. beam, and has a depth of 40 ft. 6 in. The Victorian will be fitted to carry 1,500 passengers, and will have a wireless telegraph apparatus and a complete printing outfit. Her tonnage is about 12,000, and it is expected that she will develop about 10,000 h.p., being designed for a service of moderate speed.

Duty in Canada on Rails.

The Canadian act of 1903, imposing a duty of $7 per ton on steel rails, was to take effect when the Government was satisfied that rails of the best quality were being made in Canada in sufficient quantity to supply the ordinary demand. This result is now declared to have been accomplished, by the establishment of the rail mill at Sault Ste. Marie, and the tariff act, by proclamation issued August 27, has been declared operative after that date. It will not apply, however, to rails actually contracted for outside of Canada prior to that date; but such rails must be imported into Canada not later than November 30, and must be laid on the track not later than Feb. 28, 1905.

A Third Rail Automatic Stop.

At St. Mary's, Pa., on the Pittsburg, Shawmut & Northern, a few weeks ago, a test was made of Cohen's automatic train stop, an engine having been fitted up with the apparatus, and a mile of the road north of the town being equipped with the third rail necessary for the operation of the stop. The apparatus in the locomotive consists of a white light, which burns as long as the track circuit of the section ahead is closed, and which turns to red in case this circuit is open; and a suitable apparatus for shutting the throttle valve and applying the air-brakes. This apparatus is connected with the roadway appliances by an electric current, which is conveyed by means of a brush, or shoe, sliding on the third rail. Any change in the track circuit, which in ordinary signals would turn the semaphore to the stop position, will, in this arrangement, energize the red light in the cab, shut off the steam and apply the brakes. The apparatus has been perfected by Mr. D. C. Courtney, President of the General Supply & Construction Company, of Pittsburg, Pa.

Exports and Imports for July.

The advance sheets of the Monthly Summary of Commerce and Finance show that the value of exports for July were $91,813,265, as compared with $85,228,048 in July, 1903. The value of exports for the seven months ending August 1 shows a decrease, however, being $758,984,145 as against $789,465,174 during the same period in 1903. With regard to the effect of the war upon exports, it is interesting to notice that exports to Japan during July were valued at $1,763,005 as against $1,473,350 in July, 1903. The value of exports to Korea for the month of July also shows heavy increases, being $189,610 as against $20,083 during the same month of the previous year, while the value of exports to Asiatic Russia increased from $10,310 to $62,258. For the seven months ending August 1, the value of exports to Korea was $484,967 as against $64,128 in the corresponding period in 1903. The number of locomotives exported to Japan during the last seven months was 58 as against 18 exported during the corresponding period in 1903. Exports of iron and steel continue to show heavy increases. During July, 40,313 tons of iron ore were exported as against 5,398 tons in July, 1903, and 4,611 tons of pig iron were exported as against 1,739 tons. The total amount of steel rails exported during July was 40,300 tons as against 649 tons in July of last year. The greater part of this increase was to British North America, Mexico and Japan.

Imports for July were valued at $71,196,740 as against $82,187,823 in July, 1903. During the last seven months the value of imports amounted to $579,534,293, as against $594,932,332 during a corresponding period in 1903. The largest increase in imports is from Cuba, where the Reciprocity Act continues to show its effect. During the seven months ending August 1, imports from this country alone amounted to $59,275,914 as compared with $39,958,564 in the seven months ending Aug. 1, 1903.

Control of Great Railroads.

The purchase last week of what is practically the controlling interest in the Seaboard Air Line by a syndicate of local bankers draws attention to the extent to which the controlling interest in the largest railroad systems is becoming lodged in the hands of Wall Street banking interests. The Seaboard Air Line was built almost entirely with southern capital, and until recently more than a majority of the company's stock was owned south of the Mason and Dixon line. With this last purchase, the control of every prominent Southern railroad is now held in Wall Street, although the new interests do not, of course, own a majority of the shares.

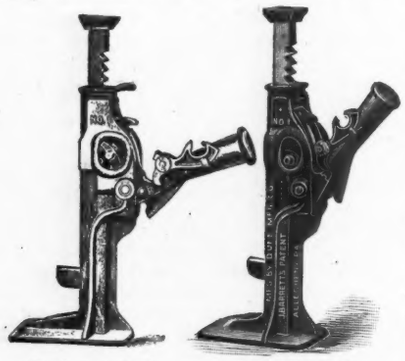
Not many years ago New England was the investment center of the country, and the controlling interest in several railroads was owned there. During recent years, however, that section has been steadily losing its holdings. At present the New York, New Haven & Hartford is probably the only large railroad system still controlled by New England interests. All of the first transcontinental lines originated in that section of the country. The Union Pacific was constructed by the Ames family of North Easton; the Northern Pacific originated with the Cheney and Billings families, of New Hampshire and Vermont; the Atchison with the Nickerson family and their associates in Boston; the Burlington with the Forbes, Thayer and Brooks families, of Boston.

The builder of the Southern Pacific and

Central Pacific was C. P. Huntington, a Connecticut boy. Only the Great Northern and the Canadian Pacific crossed the continent without assistance from New England brain and capital. New England also supplied the capital which built the Michigan Central. Now the Union Pacific, the Central Pacific, and the Southern Pacific are owned by Harriman interests. Burlington is controlled by the Morgan-Hill interests. A legal contest is being waged between the Harriman interests and the Morgan-Hill interests for the control of Northern Pacific. Atchison is peculiar, in that no single faction has a dominating interest in the company. The stock is widely scattered, but New England no longer controls it. Michigan Central is controlled by the New York Central, which is in turn controlled by Wall Street banking interests.—*New York Evening Post.*

Barrett and Buckeye Jacks.

Through an unfortunate mistake, the accompanying illustration of the No. 1 Barrett track jack made by the Duff Manufacturing Co., Allegheny, Pa., was inserted in our issue of Aug. 19 in connection with a



Buckeye Jack. Barrett Jack.

description of the Buckeye jack, made by the Buckeye Jack Manufacturing Co., Louisville, Ohio. The No. 1 Buckeye jack is also reproduced herewith. While the two jacks are very similar in appearance, which accounts somewhat for the error, there are a number of differences in the details of their design which are apparent at once to users of such tools.

Foreign Railroad Notes.

For the first half of the current year, the shipments of coal from the Prussian mines were 5.3 per cent. greater than in the corresponding half of last year; and this is the best single indication of the revival of business in Germany from the depression which began about four years ago.

On the Trans-Caucasian Railroad (from the Black Sea to the Caspian) in 1903 no less than 35,264 passengers were detected in trying to ride without tickets, and 19,681 were caught on one insignificant branch of this railroad. Russian journals intimate these are the numbers only of those who were interfered with, and that a vastly greater number made it all right with the conductors and got through without trouble and without contributing to the railroad's earnings.

A number of the strikers on the Hungarian State Railroads, accused of interfering with private rights, have been tried and a few of them sentenced to two months' imprisonment. In this case a crowd of employees got in the way of the train, some of them bled the air-brakes and some uncoupled the cars. The court condemned those who could be identified as having committed overt acts; but those who could be proved only to be in a howling mob were acquitted.

The Austrian State Railroads increased the length of road worked, 290 miles in 1903, to 7,564 miles; but only 4,911 miles belonged to the State, the remainder being either leased lines, or private railroads worked for their owners. The service on this mileage averaged 7.85 trains each way daily, earning an average of $10,915 per mile of road, about 26 per cent. of which was from passengers. Passenger earnings were a trifle less than the year before; freight earnings nearly 3 per cent. greater. The working expenses were 63⅜ per cent. of the gross earnings. The net earnings were 2.3 per cent. on the capital invested. The force with which these 7,564 miles of road were worked consisted of 47,075 men, classified as follows: 7,629 officers, 6,764 sub-officers, 32,682 servants. This is an average of 6.22 per mile of road, and 1 employee to $1,755 of gross earnings.

Manufacturing and Business.

Bids are wanted September 24 by W. E. Craighill, Major Corps U. S. Engineers, for dredging work in Mobile harbor.

The Lorain Machine & Forge Company, of Lorain, Ohio, it is said, is planning to enlarge its works by adding a foundry.

Bids are wanted September 22 by Edgar Jadwin, Capt. U. S. Engineers, Galveston, Tex., for improving the harbor at Brazos Santiago, Tex.

The Pittsburg Coal Company has received a contract for 150,000 tons of coal, with storage centers at Escanaba, Ashland and Cheboygan, from the Chicago & North Western Railroad.

The American Rotary Engine Company, of Camden, has been incorporated in New Jersey with a capital of $100,000 to make engines, etc., by V. W. Mills, E. Bovan and Wm. F. Eidell.

The Svea Construction Company, of Boston, has been incorporated in Massachusetts with a capital of $50,000. C. E. Carlson, of Quincy, is President, and C. E. Bailey, of Boston, Treasurer.

The East Indian Government will build a bridge over the Ganges river and make other improvements, including the regulation of the river bed, at an estimated cost, for both, of about $4,000,000.

The Paragon Surface Contact Railway Company has been incorporated in Delaware with a capital of $100,000 by W. H. Guthrie, J. J. Evans, W. T. Brown and C. G. Baker, of Lancaster, Pa.

The Cast Steel Draft Rigging Company has been incorporated in Delaware with a capital of $100,000 by Clarence H. Howard and Oliver T. Ledford, of St. Louis, and Arthur T. Morey, of New York.

R. C. Routledge, formerly of Thomas F. Smith & Co., New York, which concern has gone out of business, is to take charge of the contract department of the H. W. Johns-Manville Co., of New York.

A bridge, to cost about $460,000, is to be built over the Rio Diamante, Province de Mendoza, Argentina. Particulars will be furnished by Direccion General de Vias de Communicacion, Buenos Ayres, Argentina.

H. M. Pflager has resigned his position with the American Steel Foundries and is now vice-president of the Commonwealth Steel Company. His office will be at the Bank of Commerce Building, St. Louis.

Bids are wanted October 5 by the United States Reclamation Service at Montrose, Colo., for the construction of the Gunnison tunnel and approaches, which includes about 30,000 linear feet of tunnel and 120,000 cu. yds. of excavation in open cut.

The Chilian Government has ordered from the Ingersoll-Sergeant Drill Company a large Corliss Compound Compressor and a full complement of pneumatic tools for one of its largest ship-yards. The order includes "Haeseler" pneumatic tools.

The Crocker-Wheeler Company, of Ampere, N. J., announces that seven of its railway generators now at the Intramural Electric Railway power plant and machinery hall at the St. Louis exposition, will be for sale and ready for delivery on December 1.

The Cast-Thread Fitting & Foundry Co., of Seneca Falls, has been incorporated in New York with a capital of $250,000. The directors are George Breed and Watson Rulton, of Philadelphia; Paul R. Clark, of Auburn, and James P. Winkle, of Seneca Falls.

About 300 squares of Paroid roofing were recently used to replace the tin roof of the Chicago & North Western train sheds at Chicago. A large number of railroads are now using Paroid for their buildings. F. W. Bird & Son, East Walpole, Mass., are the makers.

The Atlantic-Pacific Street Railway & Surety Co. has been incorporated in New Jersey by R. R. Robinson and D. J. Huger, of Jacksonville, Fla., and M. J. McTiernan, Jersey City, N. J., with a capital stock of $200,000. The company is to operate street railways in the State of Florida.

State Engineer Van Alstyne, of New York, has received a report from Horace See, Engineer and Naval Architect, on the type of boat best adapted to the proposed thousand-ton barge canal. The designs provide for a barge 150 ft. long and 27 ft. wide, which, under 10-ft. draft, will carry 1,020 tons of wheat.

The Zanzibar Railroad Company has been incorporated in New Jersey with a capital stock of $100,000 to make railroad cars and other vehicles for transportation of all kinds and to buy and build railroads in Africa and elsewhere. The incorporators are: H. O. Coughlan, B. Stafford Mantz and Joseph Mitchel, 15 Exchange Place, Jersey City.

The Simplex Railway Appliance Co., it is said, has bought 40 acres of land in Montreal on which to build works to make bolsters. The leased plant now operated by the company will be abandoned when its new works are completed. At a later period the company intends to build cars. This company also has works at Hammond, Ind., where it makes steel springs.

Bids are wanted by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., September 27, to furnish, at the navy yards at New York, League Island, Washington, Norfolk, Pensacola and Puget Sound, a quantity of machine tools, etc., including gap lathes, engine lathes, drilling machine, milling machine, shaper, punching and shearing machine, winches, moulder, planer and a traveling crane.

Press despatches from Montreal report that a number of well-known men are going to establish the Canada Car Company and build shops in that city. Among those said to be interested are: W. P. Coleman, of New York, formerly Second Vice-President of the

American Car & Foundry Company, who will become general manager of the Canadian plant; F. N. Hoffstot, the president of the Pressed Steel Car Company, and J. A. Blair, of the New York banking firm of Blair & Co.

The Ingersoll-Sergeant Drill Company, New York, offers six prizes for advertisements best suited to the needs of the company; a first prize of $25, a second of $10, third, fourth and fifth prizes of $5 each, and an additional one of $10 for the best and most original suggestion for keeping the name of the Ingersoll-Sergeant Drill Company before the public. Any stockholder or employee of a firm or individual using this machinery is at liberty to compete. Further particulars may be obtained from the company.

Sturtevant mechanical draft apparatus has been put into the mill of the Chapin & Gould Paper Company, at Huntington, Mass., and a marked improvement in economy is reported. The company had been using a chimney, with which three boilers were barely sufficient to supply the steam needed, but with the mechanical draft only two boilers need to be used and there is a further saving by the use of a cheaper grade of fuel, made possible by the forced draft. The saving in fuel in seven months has been equal to the cost of the apparatus.

Our attention has been called to a misstatement made in the description of the 100,000-lb. coke cars for the Chicago, Lake Shore & Eastern which appeared in our issue of Aug. 19, p. 260. These cars are equipped with Miner tandem spring draft rigging and not Westinghouse friction draft rigging. It was also stated that one of the cars was in an accident and received a blow severe enough to break the sills at the end and damage the draft gear, although the floor stood the shock without apparent injury. We are informed that in the accident referred to, the draft rigging itself was absolutely uninjured, although the sills were broken.

The reorganization plan of the Colorado Fuel & Iron Co., which has been declared operative by the debenture bondholders' committee, provides that the bonded debt of the company is to be increased to $45,000,000. Holders of $1,700,000 of the debenture bonds have refused to agree to this plan and these bonds will probably retain their priority. The sum of $12,991,200 cash advanced by John D. Rockefeller, George Gould and others in 1903 will be repaid to them. The company will then be in possession of its most valuable properties. The adoption of this plan will increase the common stock by $6,200,000. The bonds and stock of the new issue will be apportioned as follows:

	Bonds.	Stocks.
Holders of assenting outstanding debentures	$14,000,000	$2,800,000
New bonds and stock for repurchase property and new capital	17,000,000	3,400,000
Retirement, 1st mortgage.	6,000,000	.....
Balance in treasury available for add. capital.	8,000,000	.....
Total	$45,000,000	$6,200,000

Iron and Steel.

The Canadian Pacific, it is reported, has ordered 60,000 tons of rails from the United States Steel Corporation and the Pennsylvania Steel Co.

The Sligo Iron & Steel Mills at Connellsville, Pa., after a shutdown of two months, has resumed operations on full time. The Meadow rolling mill at Scottdale, Pa., has also resumed work.

The Tennessee Land & Iron Co., of Dickson, Tenn., recently organized with a capital of $50,000, is planning to build an iron furnace of 100 tons daily capacity near that place. The company, it is said, has bought 3,000 acres of ore land. S. M. Drandey is Secretary.

At the Clairton furnace, No. 2, of the United States Steel Corporation, work has been resumed; also at mills Nos. 8 and 9 of the American Sheet Steel & Tin Plate Co. at McKeesport. The Standard Tin Plate Co. has resumed operations in full at its Hammondsburg, Pa., works, and work has also been started in the idle section of the Edgar Thomson Steel Co.'s blast furnace at Braddock, Pa., which has been idle since June.

The Canadian Government has given the contract for rails to be used in re-laying the tracks of the Intercolonial Railway to the Lake Superior Corporation, whose steel rail mills at Sault Ste. Marie went into operation Aug. 23, the first time since the re-organization of the company. From 30,000 to 50,000 tons will be required, on which the company, in addition to the contract price, will receive the bounty of $2.25 per ton on the steel ingots from which the rails are made.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies see advertising page 30.)

Pacific Society of Railway Surgeons.

At the annual convention of this society in San Francisco August 18, Doctor N. W. Morrison, Chief Surgeon of the Atchison, Topeka & Santa Fe, at San Francisco, was elected President.

Canadian Railway Club.

The next regular meeting of this club will be held in the Windsor Hotel, Montreal, on Sept. 6. There will be a continuance of the discussion on Compound Locomotives, from the March meeting, also of Mr. Evans' paper on Boiler Design, read at the May meeting.

N. Y. State Street Railway Association.

The twenty-second annual convention of the New York State Street Railway Association will be held in Utica on September 13 and 14. The headquarters of the association will be at the Butterfield House, and the business sessions will be held in the auditorium of the Century Club. The convention proper will open on Tuesday at 10 a.m., and, it is expected, will close about 4 p.m.

Central Railway Club.

The next regular meeting of this club will be held at Olcott Beach, September 9. The members will gather at the Iroquois, Buffalo. At the business meeting, to be held at the hotel at the beach, the subject for report will be "What Advancement Has Been Made in Paints for Protection of Metal Parts, Particularly Steel Cars," by H. M. Butts (New York Central).

PERSONAL.

—Mr. R. C. Carter, General Manager of the Bay of Quinte and the Thousand Islands Railways, died at the Victoria Hospital at Montreal, on Aug. 22, at the age of 60. Mr. Carter was largely identified with the industrial interests of Deseronto, Ont.

—Mr. G. W. McGehee, Superintendent of Bridges and Buildings of the Mobile & Ohio at Okolona, Miss., died at his home in that city on Aug. 9, at the age of 52. Mr. McGehee was a native of Virginia, and began his railroad work on the Chesapeake & Ohio in 1873, and for eight years from 1874 he was connected with the bridge department of that road. In 1882 he became Superintendent of Bridges and Buildings of the East Tennessee, Virginia & Georgia, now a part of the Southern, and four years later he resigned to take a similar position on the Mobile & Ohio.

—Mr. J. B. Middaugh, who was recently appointed Superintendent of the Florence & Cripple Creek and the Midland Terminal railroads, entered railroad service in 1885, at the age of 16, as a brakeman on the New York, Lake Erie & Western. In 1889 he went to Colorado, where he became a brakeman on the Union Pacific. He also worked on the Great Northern and the Midland Terminal; and on the latter was promoted to be conductor. He resigned his position in 1901 to become Trainmaster for the Florence & Cripple Creek, and in 1903 he was appointed Trainmaster of the Midland Terminal in addition to the position which he already held. His new appointment covers both lines and was effective August 1.

ELECTIONS AND APPOINTMENTS.

Canadian Pacific.—J. M. P. Fairbairn, Resident Engineer at Ottawa, Ont., has been appointed Assistant Engineer of Maintenance of Way, with headquarters at Montreal, Que.

Chicago, Rock Island & Pacific.—George W. Seidel, hitherto Master Mechanic of the Southern at Birmingham, Ala., has been appointed Master Mechanic of the C., R. I. & P., with headquarters at Horton, Kan.

A. C. Adams, Master Mechanic at Chickasha, Ind. T., has been transferred to Trenton, Mo. James McDonough, hitherto Master Mechanic at Dalhart, Texas, has been transferred to succeed Mr. Adams.

A. S. Zinn has been appointed Principal Assistant Engineer of the Choctaw District, with headquarters at Oklahoma City, Okla. T. G. A. Richards has been appointed Division Engineer of the Oklahoma Division, with headquarters at Chickasha, Ind. T., succeeding Mr. Zinn.

Gainesville, Jefferson & Southern.—S. C. Dunlap, Receiver for this company, has been appointed General Manager of the reorganized company, the Gainesville Midland.

Gainesville Midland.—See above.

Long Island.—J. B. Austin, Jr., has been appointed Engineer of Maintenance of Way, with headquarters at Jamaica, N. Y., succeeding P. D. Ford, resigned, effective Sept. 1.

Mexican.—E. M. Wise has been appointed Superintendent of the First Division, and James Shirley of the Second Division. L. J. Nunn, hitherto Terminal Superintendent, at Vera Cruz, Mex., has been appointed Marine Superintendent. The titles of Superintendent of Transportation, Terminal Superintendent, and Telegraph Inspector, have been abolished.

Mexican Central.—It is announced that Gabriel Morton, Vice-President and Comptroller, has been relieved of the duties of Comptroller, and that all correspondence with that department should be addressed to H. R. Nickerson, First Vice-President.

J. J. Maguire, hitherto Assistant Purchasing Agent at New York, has been appointed Purchasing Agent, succeeding F. P. McIntyre, resigned. The office formerly held by Mr. Maguire has been abolished, effective Aug. 23.

Missouri Pacific.—R. H. Dwyer, Superintendent at Pueblo, Colo., has resigned, effective Sept. 1.

Mobile & Ohio.—C. F. Blue, hitherto Roadmaster, has been appointed Superintendent of Bridges and Buildings, with headquar-

ters at Okolona, Miss., succeeding the late G. W. McGehee.

Northern Pacific.—G. A. Kenrick has been appointed Road Master of the Second District, succeeding James McDonald, resigned.

North Shore.—James L. Frazier has been appointed General Manager, succeeding W. M. Rank, resigned. R. X. Ryan has been appointed General Freight and Passenger Agent, and G. W. Heintz, Assistant General Freight and Passenger Agent. H. C. Whiting has been appointed Purchasing Agent. Mr. Lilienthal's title will be General Counsel instead of First Vice-President, as previously stated.

Pennsylvania.—G. H. Hite has been appointed Superintendent of the Pittsburg Division, with headquarters at Pittsburg, succeeding S. C. Long, who has resigned to engage in private business.

St. Louis Southwestern.—J. P. Spanier has been appointed European Agent, with headquarters at No. 11 Piazza Municipio, Naples, Italy. Mr. Spanier's efforts will be directed towards securing a desirable class of farmers who will locate on lands tributary to this line.

Seaboard Air Line.—W. E. Conklyn has been appointed Eastern Passenger Agent at New York, succeeding J. C. Horton, resigned.

Southern.—G. N. Howson, hitherto Master Mechanic at Sheffield, Ala., has been appointed Master Mechanic at Birmingham, Ala., succeeding George W. Seidel, resigned, effective Aug. 31. (See Chicago, Rock Island & Pacific.)

Tennessee Central.—A. Philbrick, Engineer of Construction, has resigned in order to accept the position of General Superintendent of the contracting firm of W. J. Oliver & Co. Mr. Philbrick will be in charge of the reconstructing work on the Atlanta, Knoxville & Northern between Knoxville and Wetmore.

LOCOMOTIVE BUILDING.

The Pennsylvania is reported to have placed an order for 25 locomotives at its Juniata shops.

Wonham & Magor, 29 Broadway, New York, have sold 12 H. K. Porter locomotives to the New York Contracting Co. of the Pennsylvania terminal.

The Chicago, Burlington & Quincy has ordered eight locomotives from the Baldwin Locomotive Works in addition to the order for 50 reported in our issue of May 27.

The Southern has ordered 25 switching locomotives from the American Locomotive Co. These locomotives will be built at the Pittsburg Works. The company has also ordered eight 10-wheel (4-6-0) passenger locomotives and 17 consolidation (2-8-0) locomotives from the Baldwin Works.

The Richmond, Fredericksburg & Potomac has ordered five simple Pacific (4-6-2) locomotives from the American Locomotive Co., for January and February, 1905, delivery. These locomotives will weigh 181,000 lbs., with 117,000 lbs. on the drivers; cylinders, 20 in. x 26 in.; diameter of drivers, 68 in.; straight top boiler, with a working steam pressure of 200 lbs.; heating surface, 2,967.1 sq. ft.; 244 Detroit seamless tubes, 2¼ in. in diameter and 19 ft. 6 in. long; fire-box, 108 in. long and 66 in. wide; grate area, 49.5 sq. ft.; tank capacity, 5,000 gallons of water, and coal capacity, 11 tons. The special equipment includes: Westinghouse air-brakes, Franklin boiler lagging, Lappin brake-shoes, Tower couplers, Dressel headlights, Simplex injectors, Damascus journal bearings, U. S. piston and valve rod packings, Star Brass Manufacturing Co.'s safety valves, Nathan triple sight-feed lubricators, Railway Steel-Spring Co.'s springs, Star Brass Manufacturing Co.'s steam gages, Gold steam heat equipment and Griffin cast chilled tender wheels.

CAR BUILDING.

The Central of New Jersey is building a number of passenger cars at its own shops.

The El Paso & South Western is reported in the market for a number of freight cars.

The St. Louis & O'Fallon is having 200 freight cars built at the Detroit Works of the American Car & Foundry Co.

The Baltimore & Ohio has let a contract to the Standard Steel Car Co., of Butler, Pa., for 1,000 40-ft. drop-end gondolas.

The Pressed Steel Car Company is furnishing steel underframes to replace the wooden underframes on the Armour Car Line tank cars.

Wonham & Magor, 29 Broadway, New York, have sold 150 dump cars to the New York Contracting Co., of the Pennsylvania terminal.

The Hocking Valley, as reported in our issue of August 26, has ordered 80 freight cars from Barney & Smith. These cars are duplicates of those last built, and are to fill in vacant numbers.

The Interborough Rapid Transit Company has ordered 100 steel passenger cars from the American Car & Foundry Co. These cars will be used in the subway and make a total of 300 already ordered by the Interborough Co.

The Southern Indiana, as reported in our issue of August 19, has ordered 125 box cars of 60,000 lbs. capacity from Barney & Smith, for immediate delivery. These cars will weigh 32,500 lbs., and measure 38 ft. 10½ in. long, over sills; 8 ft. 10¼ in. wide, over sills; and 6 ft. 8 in. high, from top of sill to under plate. The special equipment includes: Simplex bolsters and brake-beams, Westinghouse air-brakes, Tower couplers, Dunham door fastenings, Solid Draft Rigging & Equipment Co.'s draft rigging, Prince's mineral paint, Chicago metal roofs and Diamond rigid trucks.

The Norfolk & Western has ordered 20 coaches from the Pullman Co. and six baggage and express cars of 60,000 lbs. capacity from Harlan & Hollingsworth. The coaches will be 62 ft. 6½ in. long, over end sills, and 9 ft. 10½ in. wide, over siding. The baggage and express cars will weigh 73,000 lbs., and measure 60 ft. long and 9 ft. 10¾ in. wide, over siding. The special equipment for both includes: Norfolk & Western standard brake-beams, Westinghouse air-brakes, Buhoup couplers, Pintsch light and American Spring Co.'s springs; Edwards curtain fixtures, Pantasote curtain material, Gould draft rigging and platforms, and Pullman vestibules for coaches.

The Richmond, Fredericksburg & Potomac, as reported in our issues of August 12 and 26, has ordered four passenger coaches from the Wilmington Works of the American Car & Foundry Co., for November delivery. The special equipment includes: Diamond special brake-beams, Lappin brake-shoes, Westinghouse air-brakes, Damascus brasses, Tower couplers, Curtain Supply Co.'s curtain fixtures, Pantasote curtain material, Miner tandem draft rigging, Harrison dust guards, Gold heating system, M. C. B. standard journal boxes, Pintsch light, Murphy paint, American Car & Foundry Co.'s steel platforms, Railway Steel-Spring Co.'s springs, Pullman-Ajax vestibules and Griffin chilled wheels.

BRIDGE BUILDING.

Beaumont, Tex.—The Texas & New Orleans has plans ready for building a viaduct or bridge over its tracks.

Belleville, Ont.—Bids are wanted Sept. 12, by the corporation of the County of Hastings, for a four-span steel overhead truss highway bridge 356 ft. long with 16 ft. roadway, to be built upon abutments and piers at the site of O'Brien bridge, about eight miles north of Belleville. Wm. R. Aylsworth is County Clerk.

Calabogie, B. C.—A new steel bridge will be built over the Madawaska river.

Charlotte, N. C.—At a joint meeting of the Board of County Commissioners and the Highway Commission, it was decided to build steel bridges over many of the large streams in Mecklenburg County.

Cincinnati, Ohio.—The Pennsylvania, it is reported, is taking soundings to locate the site for a new bridge over the Ohio river at the east end of the city.

Cleveland, Ohio.—Bids are wanted September 21 by the Board of Commissioners of Cuyahoga County for building three steel bridges in Newburg and Warrensville townships; also for the concrete stone substructure of a bridge at Independence. William H. Evers is County Surveyor.

Doylestown, Pa.—A cloudburst in the lower end of Bucks County Aug. 20 washed away bridges near Bridgetown, Gerhart, near Hatboro, and in Cheltenham Township.

El Paso, Tex.—The El Paso & Southwestern has decided to put up a new steel bridge over the San Pedro river.

Glenolden, Pa.—The Borough Council has passed the ordinance granting the Philadelphia, Baltimore & Washington permission to widen the bridge over South avenue.

Hagerstown, Md.—A contract has been given to Nelson & Buchanan, of Chambersburg, for building three bridges in Washington County.

Jacksonville, Fla.—Application has been made to the Secretary of War for permission to build a steel drawbridge over the river at the foot of Twelfth street.

Knoxville, Tenn.—The Atlanta, Knoxville & Northern will build a bridge over Little river on its proposed line between this place and Wetmore.

Maryville, Mo.—Bids are wanted Septembed 6 by James K. Young, Bridge Commissioner, for putting up a number of bridges in Nodaway County.

Memphis, Tenn.—City Engineer Omberg has announced that the city will replace the wooden bridge at the north entrance to Elmwood cemetery with a $12,000 structure and sue the railroad for a share of the cost.

Nashville, Tenn.—The Tennessee Central and the city are considering plans for a joint bridge over the Cumberland river.

Norristown, Pa.—The Board of City Surveys has approved the ordinance for building two bridges, one over the Reading Railway at Gravers lane, Chestnut hill, and the other at Erie avenue.

Peoria, Ill.—Bids, it is reported, will soon be asked for a steel bridge to replace the present wooden structure at Bridge street. H. E. Beasley is City Engineer. (July 1, p. 22.)

Pittsburg, Pa.—The Pittsburg & Lake Erie has given a contract to the McClintock-Marshall Construction Co., of that place, for a new steel bridge at Beaver, Pa.

Santa Cruz, Cal.—Santa Cruz and San Benito Counties will jointly build a steel bridge 20 ft. wide and 200 ft. long, on concrete piers to cost $10,000.

Scranton, Pa.—The city has accepted the new West Lackawanna avenue viaduct from the contractors, Burke Bros., who began work on it May 1, 1903. The cost, $60,000, is borne jointly by the Scranton Railway Co. and the Delaware, Lackawanna & Western R. R. Co. The steel superstructure, 721 feet long, was

furnished by the Fort Pitt Bridge Co., of Pittsburg.

SMITH'S LANDING, N. J.—Bids are wanted September 7 by the Board of Chosen Freeholders for rebuilding four highway bridges in Atlantic County.

SPOKANE, WASH.—Bids will soon be asked by the County Commissioners for building a bridge on the Ingleford road.

TOLEDO, OHIO.—Bonds will soon be issued for $65,000, the proceeds to be used in repairing the present structures and putting up a number of new bridges.

TOWSON, MD.—Bids are wanted by H. G. Shirley, Road Engineer of the Highways Commission, for building three steel bridges and three reinforced concrete bridges in Baltimore County.

WARRENSBURG, MO.—Bids are wanted September 6 by W. H. Burford, Road and Bridge Commissioner, for building about 22 steel bridges in Johnson County.

WILKESBARRE, PA.—The Lackawanna & Wyoming Valley will build a bridge over the Susquehanna river between West Pittston and Duryea; also between Plymouth and Nanticoke on the new extension of its road.

Other Structures.

BUFFALO, N. Y.—The Delaware, Lackawanna & Western is making plans to build a fireproof freight house 50 ft. wide and 480 ft. long to cost about $300,000.

BUTTE, MONT.—The Great Northern, it is said, will build a new stone passenger station.

CHICAGO, ILL.—The Chicago Terminal Transfer Railway Co. has plans ready for a new freight house 30 ft. x 800 ft., to cost about $50,000.

DULUTH, MINN.—The Chicago, St. Paul, Minneapolis & Omaha has taken out a building permit for a freight shed 80 ft. x 1,000 ft. to cost about $35,000. It will be a wooden structure covered with corrugated iron.

GUTHRIE, OKLA. T.—The Denver, Enid & Gulf will soon build a new passenger station in West Guthrie.

JACKSONVILLE, FLA.—The Atlantic Coast Line Railway, it is reported, is planning to abandon its shops at Sanford, High Springs and Waycross and concentrate work at this place.

LOUISVILLE, KY.—The United States Steel Corporation, it is reported, has plans ready for building a warehouse 100 ft. x 300 ft., one-story high, to cost about $50,000, which will be the southern distributing depot of the corporation.

NEW WESTMINSTER, B. C.—The British Columbia Electric Railway will at once rebuild on a larger scale its car shops recently destroyed by fire.

PERU, IND.—It is said that the C., H. & D., which recently acquired the C., C. & L., is planning to enlarge the shops at Peru at an expense of $120,000.

PHILADELPHIA, PA.—The Baltimore & Ohio, it is reported, is asking bids for building a wharf 60 ft. x 529 ft.

PITTSBURG, PA.—A contract has been given by the Wabash-Pittsburg Terminal Railway Co. to James Corcoran at $75,000 for building the foundation of the new freight house at Liberty and Ferry streets, which will cost, when completed, about $300,000.

SPRINGFIELD, OHIO.—The C., C., C. & St. L. is planning to build large car shops on land bought about three years ago.

TYLER, TEXAS.—The Railroad Commission has approved plans for the new brick station to be built by the St. Louis Southwestern here to cost $15,000.

UTICA, N. Y.—Work on the new 20-stall roundhouse of the Delaware, Lackawanna & Western will soon be started.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ATLANTA & BIRMINGHAM AIR LINE (S. A. L.).—This company has opened its line from Atlanta, Ga., to Rockmart, 47 miles, for freight traffic. The rest of the road to Birmingham will be opened for traffic before the end of the year. A full description of this line was given in our issue of July 1, p. 104.

BALTIMORE & OHIO.—An officer writes that the daily press reports concerning extensive improvements on the Wheeling Division between Washington and Wheeling, Pa., are erroneous. The only work that is being done on this division at present is the connecting of several sidings to form a second main track.

BIG BEND RAILROAD.—According to newspaper reports, this company has been organized in Washington to build a railroad 45 miles long from Ephrata northwest to Chelan. W. J. Long, of Chelan, Wash., may be addressed. Connection will be made with the Great Northern at Ephrata.

BUFFALO & DEPEW (ELECTRIC).—It is reported that this company is planning to extend its line from the present terminus at Depew, N. Y., east to Rochester, 50 miles. H. H. Kingston, Buffalo, N. Y., is President.

CHICAGO & NORTH WESTERN.—An officer writes that the work which this company is doing in the vicinity of Rat river, Forest County, Wis., is merely a continuation of a logging track from a connection with the main line two miles south of Laona to some lumber mills in the same county. The track is in the nature of a siding and is not a new line. (August 26, p. 73.)

CINCINNATI, HAMILTON & DAYTON.—An officer writes that contracts for ties and rails have not yet been let for the branch line from Dayton to Richmond. It is reported, however, that work on this line will be begun in the fall. (Aug. 26, p. 73.)

EL PASO & SOUTHWESTERN.—Press reports state that the Phelps-Dodge syndicate, which owns this road, has placed engineers in the field to make surveys for the proposed extension from Nacozari west to Topolobampo, on the Pacific coast of Mexico, about 200 miles. The line, as projected, will pass through an undeveloped section of Western Mexico, which is rich in natural resources. (See Construction Supplement.)

FREEO VALLEY.—Grading is reported in progress on this proposed railroad from Eagle Mills, in Ouachita County, Ark., northeast to Princeton, in Dallas County, 25 miles. Two miles of track have been laid. Polk Bros., Camden, Ark., are the contractors. D. S. Gates, Eagle Mills, Ark., is President. (May 27, p. 410.)

IONE & EASTERN.—An officer writes that a contract has been let to the Atlas Contract & Supply Co., San Francisco, to build and equip 12 miles of road from Ione, Cal., to Amador, with a 13-mile branch from Sutter Creek to Volcano. A part of the contract has been sublet to Ericson & Peterson, of San Francisco. The contract calls for the completion of the first section by the end of December. H. E. C. Feusier, 311 Rialto building, San Francisco, is Chief Engineer.

KANSAS CITY, OKLAHOMA & HOUSTON.—Press reports state that work has been begun on this line, which is projected to run from Kansas City through the State of Kansas and Oklahoma Territory to Houston, Tex., 710 miles. B. P. Beam, Kansas City, Mo., is President.

KENTUCKY MIDLAND.—Incorporation has been granted this company in Kentucky with an authorized capital of $1,000,000. It is proposed to build a line from Madisonville to Central City, 26 miles. R. J. Jennings, B. E. Wood and others, of Madisonville, Ky., are incorporators.

LACKAWANNA & WYOMING VALLEY (ELECTRIC).—Press reports state that rights of way have been secured for an extension south to Sunbury, Pa. The road runs from Wilkesbarre northeast to Scranton, 20 miles, and an extension from Scranton to Carbondale is now being completed. A description of this railroad was given in our issue of April 22, p. 300.

LAKE ERIE & PITTSBURG.—It is reported that termini of this road will be Lorain and Youngstown, the distance between which is about 90 miles. Grading is reported in progress between Berea and the Cuyahoga river, 17 miles. The line has already been graded between Lorain and Berea, 13 miles. The maximum curvature will be 4 deg. and the maximum grade .6 per cent. It is said that the line will eventually be extended from Youngstown to Pittsburg, 50 miles. William Kennifick, Kansas City, Mo., is President. (August 19, p. 65.)

LITTLE BAY & HAMPTON.—The proposed route of this road, which was recently incorporated in Arkansas, is from Little Bay through Gordon and Woodberry to Hampton, 20 miles. H. M. McLachlin, Little Bay, Ark., is President. (July 15, p. 35.)

LOUISVILLE & ATLANTIC.—According to press reports, surveys are now in progress for an extension of this road from Beattyville, Ky., east through Wolfe and Magoffin Counties to Prestonburg, 50 miles. The road runs at present from Versailles to Beattyville, 101 miles.

MEXICAN ROADS.—The Merida-Peto railroad has been granted a concession by the Mexican government to build an extension from a point on the main line to Villa de Satula, 80 miles. R. G. Canton, Merida, Yucatan, is President and General Manager.

MIDDLETOWN & CECILTON.—Work has been begun on this railroad, which is projected to run from Middletown, Del., southwest to Cecilton, Md., 10 miles. Connection will be made with the P., B. & W. at Middletown. A heavy grain business is expected. W. B. Davis, Samuel Hurlock, W. R. Polk and others, of Wilmington, Del., are incorporators.

MILLERS CREEK.—Articles of incorporation have been filed by this company in Kentucky. It is proposed to build a railroad 16 miles long up Johns creek, in Johnson County. The names of incorporators are not given.

MINERAL POINT & NORTHERN.—Work is reported in progress on this proposed road from Mineral Point, Wis., to Highland, 30 miles. The Empire Construction Co. are the contractors. C. W. McIlhon, Mineral Point, Ark., is President. (See Construction Supplement.)

MISSOURI PACIFIC.—Owing to the high water last spring, which damaged the roadbed of the Joplin Division, the track is to be raised five feet above the present grade between Rich Hill and Butlet.

MOXAHALA & BRISTOL.—This company has been incorporated in Ohio with an authorized capital of $25,000 to build a railroad from a point near Moxahala, in Perry County, connecting with the Toledo & Ohio Central, to a point in the same county, where connection will be made with the Baltimore & Ohio.

NEW YORK CENTRAL & HUDSON RIVER.—A contract has been let to Charles A. Sims & Co., of Philadelphia, for riprapping the embankment of the Harlem division within the limits of the Croton watershed and between Bedford and Croton Falls, N. Y.

NEW YORK, NEW HAVEN & HARTFORD.—The plans of this company for an improved rapid transit in the Borough of the Bronx, New York City, and in Westchester County are

discussed at length elsewhere in this issue. The work will include the six-tracking of the Harlem River branch. Four of these tracks will be equipped electrically with the third-rail system. The estimated cost of the entire work on this branch is $7,701,891; $4,825,891 for the roadway and stations, and $2,876,000 for the electrical equipment and apparatus.

Overton County.—Surveys are reported completed for this road from Algood, Tenn., northeast to Livingston, 15 miles. Connection will be made with the Tennessee Central at Livingston. It is stated that the Southern Construction Co., of Philadelphia, will let the contracts for the work early in the fall. J. A. Hargrove, Livingston, Tenn., may be addressed. (April 15, p. 298.)

Paragould & Memphis.—The directors have voted to extend the line from Paragould north to Poplar Bluff, Mo., 50 miles, passing through Piggott, Ark. Work will be begun at an early date. The Paragould & Memphis at present extends out of Cardwell, Mo., for 24 miles. J. E. Thomas, Cardwell, Mo., is President. (April 29, p. 336.)

Pittsburg, Summerville & Clarion.—This road was opened for traffic between Summerville, Pa., and Clarion, 16 miles, on August 29. A branch line from Strattonville to Mill Creek, four miles, is now being surveyed. Bennett & Nolan, Reynoldsville, Pa., are the contractors. C. F. Heydrick, Brookville, Pa., is President. (April 29, p. 336.)

St. Louis Southwestern.—Press reports state that this company is about to begin work on an extension from Onalaska, Ark., in a southerly direction to Locust Bayou, 10 miles.

RAILROAD CORPORATION NEWS.

Atlantic & Lake Superior.—Galindez Bros., London, have brought suit against this railroad for $380,440. The plaintiffs claim that this amount is due them as accumulated interest on debenture bonds which they hold.

Atlantic Coast Line.—J. P. Morgan & Co., New York, are offering at 95 and interest, the unsold portion of the issue of $35,000,000 Louisville & Nashville collateral 4 per cent. 50-year gold bonds. These bonds are subject to call at 105 and interest, at the company's option. They are secured by a deposit of $30,600,000 of the capital stock of the L. & N., of which there is $60,000,000 outstanding.

Boston & Maine.—The report of this company for the fiscal year ending June 30, 1904, shows gross earnings of $34,894,608, an increase of $1,155,623. Operating expenses increased $1,038,536, leaving an increase in net earnings of $117,088. After payment of all fixed charges and dividends the balance for the year was $70,457 as against $22,186 in 1903.

Canadian Pacific.—The directors have sent notices to the stockholders stating that at the annual meeting on October 5 a vote will be taken on a proposition to increase the capital stock $25,000,000. The new stock will be offered to the stockholders at par, and the proceeds from the sale will be used for building the new line from Sudbury to Toronto, and to build extensions on the Prairie division. As the reserve fund is now upwards of $13,000,000 the proposed action will give the company about $38,000,000 for new work.

Chicago, Indianapolis & St. Louis Short Line.—Harvey Fisk & Sons, New York, are offering at par and interest, $500,000 of this company's outstanding issue of $3,000,000 first mortgage 4 per cent. 50-year gold bonds. The bonds are guaranteed as to principal and interest by the C., C., C. & St. L., and are a first mortgage lien on the double track line between Hillsboro, Ill., and Mitchell, 45 miles, which connects the Cairo, Vincennes & Chicago with the main line of the Big Four between Terre Haute and St. Louis.

Erie.—The report of this company for the fiscal year ending June 30, shows gross earnings of $45,201,163, a decrease of $629,250. Operating expenses increased $2,656,080, leaving a decrease in net of $3,285,330. After payment of interest on bonds, dividends on first preferred stock, and expenditures for additions and improvements, the surplus for the year was $1,096,037, a decrease of $4,852,544.

Manila Railroad.—At a recent meeting of the stockholders, an agreement was ratified with Speyer & Co., of New York, for the purchase by that firm of $2,100,000 2½-year 6 per cent. notes and $5,000 deferred stock. The latter carries voting power which gives control of the railroad to Speyer & Co. The road runs from Manila, P. I., to Dagupan, 120 miles.

Marion & Rye Valley.—This road, which runs from Marion, Va., to Sugar Grove, 18 miles, has been sold to the United States Spruce Lumber Company. The road connects at Marion with the Norfolk & Western.

Muscatine North & South.—This road, which runs from Muscatine, Iowa, to Elrick Junction, 29 miles, will be sold at auction on October 5. No upset price is named. Charles Howard, Muscatine, is receiver.

New York & Canada.—The stockholders of this company, which is leased to the Delaware & Hudson, and forms its line from Whitehall to Rouses Point, will hold a meeting on September 8, to vote on a proposition to increase the company's capital stock from $4,000,000 to $9,000,000. The new stock will be preferred stock entitled to non-cumulative dividends at the rate of 5 per cent. annually.

Pere Marquette.—The details of the $65,000,000 mortgage which this company recently filed with the New York Security & Trust Company have been made public. As stated in our issue of August 26, the bonds will run for 50 years and will bear interest at the rate of 4 per cent. annually. Of the total amount of $65,000,000 the sum of $5,051,000 is issuable at the request of the directors, and $13,175,000 is reserved for building second track and extensions, to be used at the rate of not over $25,000 per mile of new road, or $12,000 per mile of second track. The remaining $46,774,000 is reserved for refunding purposes.

Seaboard Air Line.—Thomas F. Ryan has announced that he has purchased for himself and his associates, Blair & Co. and T. Jefferson Coolidge, Jr., the stocks of this company which were held by the firms of John L. Williams & Sons, of Richmond, and J. W. Middendorf & Co., of Baltimore, amounting to 140,000 shares. The price paid was $15 a share for the common and $25 a share for the preferred, the stock to be delivered at once. As a result Mr. Williams and Mr. Middendorf will retire from the board of directors. Mr. Ryan says that no other railroads are interested in the purchase or the management of the road.

Southern California (A., T. & S. F.).—The directors have decided to sell the stock of the company, amounting to some $13,000,000, to the Atchison, Topeka & Santa Fe. This transfer is principally a matter of bookkeeping, the Atchison having had control for several years. The property embraces all of the main and branch lines, as far east as Barstow, about 500 miles.

Tidewater R. R.—This company has secured control of the Farmville & Powhatan, which runs from Bermuda, Va., to Farmville, 89 miles. The Tidewater Railroad is projected to run from Norfolk, Va., west to a point on the State line in Giles County, but work has not yet been begun. B. T. Elmore, Roanoke, Va., is Chief Engineer.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY BY
THE RAILROAD GAZETTE
At 83 Fulton St., New York.

EDITORIAL ANNOUNCEMENTS:

THE BRITISH AND EASTERN CONTINENTS edition of the Railroad Gazette is published each Friday at Queen Anne's Chambers, Westminster, London. It consists of most of the reading pages and all of the advertisement pages of the Railroad Gazette, together with additional British and foreign matter, and is issued under the name, Transport and Railroad Gazette.

CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

FRIDAY, SEPTEMBER 2, 1904.

CONTENTS

EDITORIAL:
Unions *vs.* Individual Progress 289
Estimating the Value of Railroad Property 289
Freight Damage Bills, Their Settlement.. 291
The German Railroad Union in 1902.... 291
Railroad Gross Earnings for July..... 292
Editorial Notes 290
Trade Catalogues 292

ILLUSTRATED:
The Schenectady Locomotive Superheater 292
Method of Adjusting Bridge Cables..... 294
Bridge Wrecked by Cyclone at St. Paul... 295
The Ganz Rail Auto-Car..... 296
Card System for Eng. Information..... 298
Jubilee of the North-Eastern Railway... 300
Chicago Freight Houses of the Balt. & O. 302
Signal Batteries in Summer 305
Railroad Shop Tools 306
Box and Undercut Tools—Santa Fe Shops 309
Rotary Steam Valve for Air-Brake Pumps 310
A Double-Track Concrete-Steel Arch..... 310

CONTRIBUTIONS:
Draft of "Baltic" 292

MISCELLANEOUS:
The Effect of Unions on Railroads 295
How to Handle Freight Safely..... 297
Specifications 299
Foreign Railroad Notes 303
Future of Interurban Electric Railways.. 304
Panacea for Butting Collisions..... 307
Master Mechanics' and Master Car Builders' Committees, 1905. 308
New Haven's Bronx Electrification Plans 309
Analysis of Passenger Train Earnings.... 311
New Train Rules on Delaware & Hudson 312

GENERAL NEWS SECTION:
The Scrap Heap 75
Meetings and Announcements 77
Personal 77
Elections and Appointments 77
Locomotive Building 78
Car Building 78
Bridge Building 78
Railroad Construction 79
Railroad Corporation News..... 80